

OPERATIVE DENTISTRY  
FOR CHILDREN

—  
JORDON

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OPERATIVE DENTISTRY  
FOR CHILDREN



# OPERATIVE DENTISTRY FOR CHILDREN

A TEXT BOOK DEALING WITH THE PROPHYLACTIC AND  
CURATIVE TREATMENT OF THE TEETH OF THE CHILD,  
BASED UPON EXPERIENCES GAINED DURING MORE  
THAN TWENTY-FIVE YEARS DEVOTED TO THE  
CARE OF CHILDREN EXCLUSIVELY

BY

M. EVANGELINE JORDON, D.D.S.  
LOS ANGELES AND SAN FRANCISCO, CALIFORNIA

WITH 158 ILLUSTRATIONS



BROOKLYN, NEW YORK  
DENTAL ITEMS OF INTEREST PUBLISHING CO.  
LONDON  
CLAUDIUS ASH, SON & CO.  
1925

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DENTAL ITEMS OF INTEREST PUBLISHING COMPANY



H. 177  
R. 1502  
B. 6-1  
17-5  
17025

To  
THE CHILDREN OF THE WORLD.  
BETTER TEETH WILL MAKE A BETTER WORLD.

*I Wish to Thank*

Dr. R. Ottolengui, Dr. Harvey Stallard,  
Dr. B. B. McCollum and Grace Fernald,  
Ph.D., for their kind assistance in helping  
me prepare this book.

—*M. Evangeline Jordon.*



## Preface

This preface is written at the request of the Author. Dr. Jordon writes as follows: "I should like to have you write a preface for the book, because if it had not been by your advice and suggestion, I doubt if the book would ever have been written."

I had the honor of meeting Dr. Evangeline Jordon in San Francisco, during the Congress held in conjunction with the Panama Pacific World's Fair. This was in 1915. Prior to that time I had never heard of a dentist specializing exclusively in dentistry for children. The word "pedodontia" had not yet been coined. I was consequently surprised to learn that a woman had long been doing just that; limiting her dental services to children under sixteen, and declining to serve even her own patients after that age.

I was therefore greatly interested in the paper announced over her name in the Program of the Congress. Imagine my surprise, when I did hear it, to discover that it was one of the very best papers presented before the Congress, and one of the soundest appeals for proper care of children's teeth that I had ever heard, or read.

A few years later, when a member of the Executive Committee of one of our local societies, I recommended that Dr. Jordon be invited to appear before us. The invitation was accepted, and her visit to us in the East proved both pleasurable and profitable—to us. Dr. Jordon is probably the only woman dentist, and one of the very few dentists of either sex, whose work has been deemed of sufficient importance to merit an invitation to cross this continent to read a paper.

Dr. Jordon, so far as we have been able to learn was the first dentist to practice exclusively for children, and thus she is the pioneer pedodontist of the United States, and perhaps of the world.

During her visit to this coast I had the opportunity to become better acquainted with Dr. Jordon, and partly because of what I knew of her work, and of her experience with children, and partly in the interest of the profession at large who might easily profit by a recital of her methods

## PREFACE

of practice, I did, as she says, urge her to prepare the series of papers which have been published in Dental Items of Interest, and which are now compiled and published in book form.

It is my opinion that the reader will find both entertainment and advantage from reading Dr. Jordon's work.

R. OTTOLENGUI.

## Introduction

There is an increasing need and demand for good dentistry for young children; not children in groups in school clinics, or other public bureaus, but children in private practice, where advantage of every device at hand should be taken to promote the highest welfare of the little patients.

To the dentist in general practice who recognizes the value of such work *early in life*, as well as the student, I am addressing this description of how I have conducted such a practice. I am giving the details not of theory, but of the actual experiences of myself and the operators associated with me. Poor dentistry, practiced upon children, causes unnecessary suffering and malocclusion. I entreat every dentist to consider the thought that for each individual case coming for relief he should give not only temporary relief, but he should lay a firm foundation for future health and perfect dentures.

There is an increasing demand for a book on dentistry for young children, and so far, no author has published a practical one. Since my graduation from the Dental Department of the University of California in 1898, I have practiced mainly with children, and since 1909 exclusively with children. I hereby offer my methods in this branch of the profession.

The laity is asking for this service and appreciates it, as shown by the large numbers of patients who come from long distances to Southern California for this work. If a city the size of Los Angeles can support several offices where children alone are treated, every town in America needs at least one. In fact a definite knowledge of the treatment of little children is necessary to every dentist in general practice.

Furthermore, each year, thousands of students are graduated from the dental colleges, and most of them must begin practice in a small way. To these recent graduates, mothers of the neighborhood, not realizing the value of a dentist with experience in handling small children, send their little ones. Unfortunately, most colleges lay stress upon reparative work on permanent teeth and few students get the necessary training in the treatment of *diseased deciduous* teeth. Starting without definite knowledge, these newly established dentists blunder along and possibly succeed

## INTRODUCTION

in rendering some good service. However, the majority fail with children and thus lose the confidence of the older members of the family. Not only is this a financial mistake but it is also an ethical error. If they could have had proper training on children's teeth, that success would have laid a firm foundation upon which to build a future practice.

If we are going to live up to the slogan, "Add ten years to life," why not begin at the logical time, to store up good health and resistance to disease by the conservation of sound teeth and healthy soft tissues in the oral cavity?

Why not be prepared to do thorough constructive work from the earliest period at which the parent can be induced to bring a child instead of saying, when consulted, as thousands of dentists are still advising, "There is no need of work on the first teeth." There is the greatest need of work on these first teeth, as is proved by the fact that eighty per cent of school children suffer from dental caries.

This refusal of many dentists to care for the youngest children—and the resulting foci of infection in the mouths of children—has brought the dental profession into disrepute.

Dental caries is a preventable disease of childhood, due to incorrect diet and lack of care. That it is not wholly due to disease is shown by children who, though ill from birth, through continuous care have perfect teeth. That it is not due to heredity is shown by children with perfect teeth where the parents have very bad teeth. Carious teeth sometimes seem to be inherited, but upon investigation will be found to be the result of imitating the *bad habits* of the parents.

Dental caries could be eradicated in a generation as certainly as have been yellow fever and the plagues. Instead of destroying the deadly mosquito and flea, it would only be necessary to rid the country of the more deadly candy shop and grocery store, get most of our living from the vegetable garden and the family cow, and apply the teachings of oral hygiene.

The examinations made during the war disclosed the dire results of neglected teeth in childhood. These examinations were made of the young men of the nation; but no doubt an equal or even larger number of girls and young women are as far below normal. This indicates that the future health and morals of the nation are in great danger. It also throws an immense responsibility upon the dental profession. In no other way could more loyal service be rendered to our country than by building up a vigorous race through eradicating dental caries in childhood.

M. EVANGELINE JORDON.

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# OPERATIVE DENTISTRY FOR CHILDREN

## CHAPTER I.

### Management of Children in the Office.

To the average dentist the management of a crying, hysterical child presents one of the most difficult problems in child practice. The dentist's office carries with it more emotional stimulation than almost any other situation in the life of the average child. The younger the child, the more serious is the problem of controlling the situation. To the person who has made a careful study of children, the problem is very simple.

The man (or woman) who attempts to work for children must prepare himself for the task. Before having worked for children many dentists express themselves as, "not having patience with children," or "disliking children," but after one has made a sincere effort to succeed he will never again express himself in this way. He may have had to call upon a reserve of kindness and patience that he does not know he possesses, but when the work is completed a feeling of satisfaction will repay him for the effort he has made.

At heart, every true man loves children and after he has once rendered a valuable service to a suffering child he will be ambitious to try again to see if he cannot be more successful with the next one.

Seldom does an operator take up children's work because he loves children, but more often because it is the best opening offered. I have never known a dentist once having *successfully* practiced for children who was willing to take up general practice. The variety and charm of *preventive* work soon draws the children's dentist into closer touch with the family problems, and he exercises an active concern in the future health and welfare of each little patient. He soon forgets the struggle he had in treating the abscessed teeth in the mouth of a two year old, by watching the renewed health and growth of the little one, and, as years pass, how anx-



iously he awaits the eruption of the permanent teeth replacing the treated ones. Watching growing things is a most entrancing occupation, as any gardener will tell you, and watching children grow in the garden of children's dentistry repays one for all one's anxiety and nerve strain.

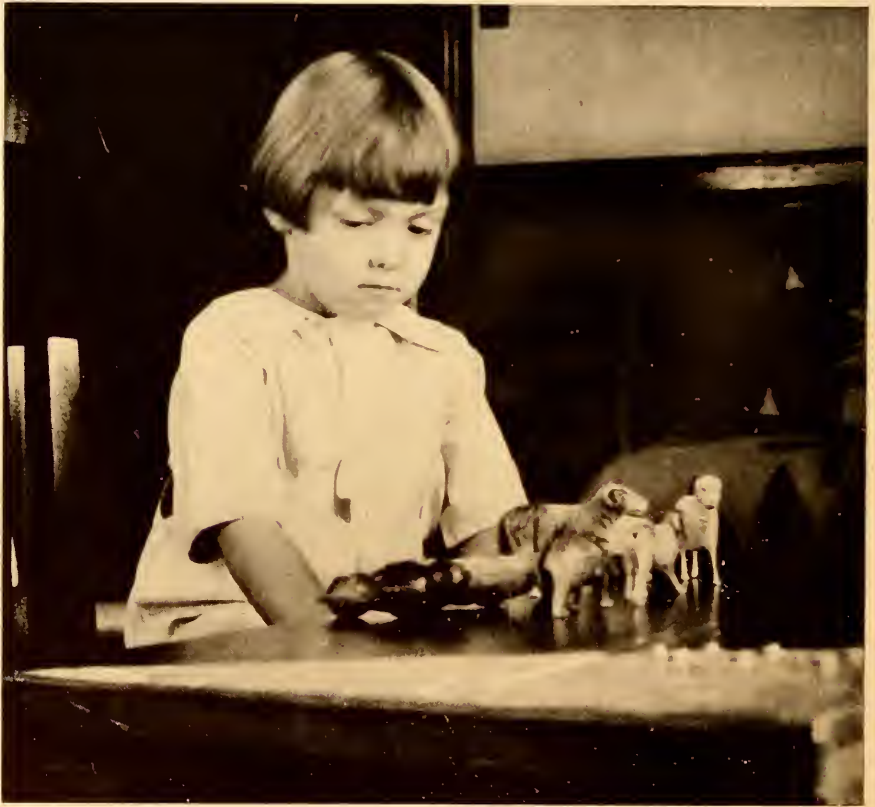


Fig. 1. Playing with celluloid toys in the waiting room.

**Attitude of the  
Dentist.**

The bearing of the dentist is of great importance. He must radiate comfort and intelligent confidence to the child as well as to the parent. His attitude must be that of a kind, cheerful, understanding friend.

The dentist should feel the *profoundest responsibility* as to the impression he will make upon the mind of the child. It may mean the future dental health of the child, or, if he fails to impress the child, it may be impossible for that child ever to trust a dentist again. I once had the care



of a girl of fifteen who had been badly frightened while in the dental chair at the age of seven. Some careless or unprincipled action of the man had given her such a scare, that until she heard of a woman dentist she would never go near a dental office again. She confided to me that although she often suffered from toothache (she did not have a sound tooth left and the first permanent molars were a mass of broken roots) she would conceal her suffering rather than be again insulted.



Fig. 2. Children in the waiting room.

Whenever she thought of going to a dentist, so strong an emotion was aroused, that she was unable to overcome it and therefore endured the suffering.

It is an established psychological fact that early emotional experiences have a permanent effect on a person's attitude toward a specific situation. It is even true in many cases where the person is not aware of the original cause. This is particularly true with regard to dental operations, and consequently the person working for children has an increased responsibility.

The above story shows how necessary it is to have an attendant at the chair, as with some neurotic types the imagination or misinterpretation of

actions might cast a serious reflection upon the name of the dentist, if the child carried away such a story. An attendant or nurse is always necessary in handling children. She must be discreet and should not make personal remarks about the child. An indiscreet nurse had finally to be dismissed, after repeated warnings, because she remarked about the sunburnt condition of the knees of a little girl of nine. The child cried because she was just beginning to be sensitive about her personal appearance. A discreet, intelligent and patient nurse is particularly necessary in handling neurotic girls.

**Reception of  
Children.**

In the waiting room the child and his parents are received by a sympathetic, understanding secretary who offers him toys and books with which to beguile the period of waiting. The attitude of the happy little patients, who are waiting their turn, puts him into a psychological frame of mind to enter the operating room in a receptive mood. (Figs. 1 and 2.)

The effect of children together in the *operating* room is very beneficial. A nervous child coming into a room where there are other little children in the operating chairs has much greater confidence in placing himself in the hands of the operator.

Timid little children are often brought with older brothers and sisters and allowed to sit in the operating room (without mother or nurse) two or three times before any work is attempted for them. In such a case the child in the chair is put upon his honor to be good and not frighten his little sister. Sometimes the reverse happens, as the following story shows.

A badly frightened five year old boy, named Dick, had to be held during his first appointment (in the manner described later in this chapter) until, seeing he was not hurt, he became a very good patient. When he came for his fourth appointment, his nine year old brother also came for work. Dick noticed that his brother moved in fear of the engine and said to him, "Why Harold, do you think I would do that?"

As your patient and his parents come into the operating room, study the attitude of the parents to the child and the attitude of the child to the parents. It often gives you a clue as to the nature of the child.

Each child must be studied as an individual.

**Types of Children.** Some understanding of psychology is valuable because the treatment must vary according to the classification to which the child belongs.

First we have the mental classification.

I. The characteristics dependent on intelligence.

a. Feeble minded or mental defective (arrested development).

1. Idiot.
  2. Imbecile.
  3. Moron.
  - b. Border line.
  - c. Normal.
  - d. Superior.
    1. Precocious (ahead of years).
    2. Genius (exceptionally bright).
  - e. Peculiar (not responsive to the ordinary training given children. He does not develop well under it).
- II. Instinctive (that is controlled by the instincts or emotions). Emotionally unstable.
- a. Nervous.
  - b. Fearful.
    1. Stubborn.
    2. Sullen.
- III. Psychopathic.
- Hysterical.
- Epileptic, etc.

The child who is mentally defective, or of borderline intelligence is generally in need of dental care because the efforts at home to keep him upon a sensible diet and to keep his teeth clean are not successful. He is much more difficult to handle, as his reactions are responsive to more primitive stimuli. His behavior is like that of a wild animal in captivity. He displays all the traits of the emotionally unstable and may be nervous, hysterical and stubborn because of his fears. Under five, such children must often be held during the entire period in the chair for necessary work; when over five it is often possible, through patience, to win their confidence. One such boy, at the age of eight, clung stubbornly to a large armchair in the operating room and refused to get into the dental chair. When an attempt was made by the nurse to put him in the dental chair he scurried under the armchair like a little wild animal. He was finally persuaded to have an aching tooth filled with cotton dipped in carbolized resin\* while standing before the armchair in which I was seated. He derived so much comfort from this, that the next day he was persuaded to sit in the dental chair while the dressing was replaced. In a few days I was able to go on with his work in quite an ordinary way and he continued to come regularly until his fourteenth year. He often declared that he loved me and knew I would do nothing to hurt him.

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\*Fletcher's Carbolized Resin.

Another such boy had an obsession that he could not spit into the bowl, and I won his confidence by always having him lean sidewise over the bowl, when washing out his mouth, letting the water drip into the bowl as I do with a child under two.

A mentally defective child is more amenable to suggestion than a normal child. But the attitudes of the mental defective, or even of the normal *young* child, are much less permanent than those of normal. He must be repeatedly reassured and must at all times be guarded with greater care. He must see and hear nothing that will frighten him while in the dental office. Such a child should never be brought into the operating room where a patient is crying or showing any other undesirable emotion. It immediately suggests to his mind painful impressions. For the same reason, no child should ever be allowed to leave the operating room while crying, or he will convey an unfavorable impression to the mind of some such child in the waiting room. Where a child is crying at the end of an operation, it is best to recall the parent and have them remain together in a dressing room until the child has regained his composure.

Very few psychopathic children reach the hands of the average dentist. If such a case does come for dental work it should be handled in conjunction with the attendant physician.

As civilization becomes more complex the child reacts from more than one stimulus. The normal child who has been told fearful stories of the dental office reacts to nervousness and fear, and, until reassured is often difficult to control.

Children when brought to the dental office must also be classified as well or ill.

A child when well, if mentally normal, is easily handled, but the same child if ill, from a night or two of sleepless suffering, is apt to display fretfulness, restlessness, indifference, nervousness or timidity which will greatly tax the patience of the operator.

Children must also be classified as to age.

Under the age of three, the attention may be diverted but little can be done through reasoning. Over the age of three, to the mentally normal child, operations may be explained in a simple way and the attention held. When the age of five or six is reached pride may be called upon as an aid.

The home training of the child is reflected in his behavior in the office. A well trained, mentally normal child, even if timid, tries to overcome his fears, but an undisciplined child makes no such effort. If in good health the first child will be seated in the chair without trouble. The second child often shrieks and clings to his parents and nothing can be accomplished until he quiets down.



A girl of eleven of the first type came to us because she was so frightened she would not go to a dentist in general practice. She was to have a tooth prepared for an inlay. She asked whether it would hurt or not. The operator said, "I do not know, Evelyn; with some children it does and



Fig. 3. Swimming celluloid ducks in fountain spittoon. This is not permitted except when the water is clean.

with some it does not. You will have to decide whether you would rather have it hurt now and save the tooth, or let it decay, suffer toothache and lose the tooth." Evelyn thought a minute and said, "It is better to have it hurt now and save the tooth."

The second type is illustrated by a girl of the same age who acted very badly and finally bit the fingers of the operator, whereupon she was given a sharp tap on the hands, which so surprised her that she settled into good behavior. Several days later the operator said to her, "I called your bluff



Fig. 4. Swimming celluloid ducks in fountain spittoon. Permitted only before the spittoon is used.

didn't I?" and Dorothy answered, "I could have bluffed if I had tried hard enough." Dorothy has conceived such an admiration for that operator that she is not willing to wait two months for her regular prophylactic treatment, so on one occasion told her mother she had lost a temporary filling, (which on examination was found to be in perfect condition,) so that she could come at an earlier date.

Do not assume from the above story that I believe in slapping children. I believe very much to the contrary. Very rarely, with the undisciplined, mentally normal child, or with the emotionally unstable hysterical type, a sharp word, a tap upon the interfering hands or a little shake will work wonders in diverting the mind of the child; but remember that such discipline must never be given without the full *understanding* and *consent* of the parent.

When the small child is seated in the dental chair, attract his interest through the celluloid ducks and fishes that swim around in the cuspidor. (Figs. 3 and 4.) Most normal children are very reasonable, and a quiet explanation of the nature of the work, with the assurance that it will be done with as little pain as possible, generally enables the operator to continue without difficulty.

**Management of  
Children Who Cry  
or Struggle.**

Many children under three years of age *always* cry, but most of them very quickly lose their fears when their attention is engaged. Mentally defective children must be classed with infants and must often be worked upon when crying; great patience and skill is necessary on the part of the operator to do lasting work. In such cases the parents must understand that more time must be taken and that the fees accordingly must be larger.

For the child between three and six, it is often necessary to allay fears. This is especially true if there has been a previous experience of a surgical or dental operation, which has left a recollection of pain. If a normal child will not listen but continues to cry and struggle, the following plan has never failed: explain to the parents that you will hold him until he stops crying, and dismiss them to the waiting room. With the right hand, hold a folded napkin over the child's mouth so arranged that it does not cover his nose, place the left arm around his head, and with the left hand *gently* but *firmly* hold his mouth shut. His screams increase his condition of hysteria, but if the mouth is held closed there is little sound, and, he soon begins to reason. Have the nurse hold his hands and feet. Tell him in a low, gentle voice that nothing is going to hurt him and that you will take the napkin away as soon as he promises to be good. After he has cried for a few minutes and begins to relax, ask him if he will be good. If he assents, immediately release him and give him a drink of water, but if he has been badly bred or belongs to Class II, and his fears make him appear of a stubborn disposition, it may be necessary to hold him several more times before he finally yields. As a rule, such children, when they find they are not hurt, make the best patients. It is often necessary to tell the

child that you will hold him until he is good, even if it takes all day, but you are sure he will not want to keep his mother waiting so long. Many cases do require from a quarter to a half hour to calm down, before you can finally remove the napkin. One child who was disciplined *forty-five minutes* in this way is now one of my best little patients.

If you win the struggle, impress upon the child that his welfare was your only object and that you are not in the least angry with him. If you give up without doing any work, the *child* has won the victory and you can never succeed with him. The worst feature of your not having been able to convince him that the work will not hurt, lies in his impression of having won in a victorious struggle. This will make it doubly hard for the next dentist; or perhaps the disheartened parents will give up; then the subsequent ill health of the child should justly be laid at your door.

Many parents come to the office in a very nervous and fearful condition, and they have the worst sort of an influence upon a thoroughly frightened

**Influence of  
Nervous Parents.**

child. If parents could only be made to realize their responsibility they would change their attitude before the child and not constantly suggest fear and pain. Every dentist knows how often he has heard the parent say in the hearing of his prospective patient, "I don't blame Tom for being frightened. I am a perfect coward in a dental office myself;" or, "I just hate going to the dentist." Before doing any work the child of such a parent must respond to the suggestions of the operator that there is a difference between dental offices and that in this office special care is taken not to hurt children.

Almost every child is more self reliant and will listen to what is told him if the distracting influence due to the presence of the parents is removed. Such a child, as soon as the parent is out of the room, will often stop crying to see what will happen next. Frequently before the appointment is over, he may be telling you of his pets at home.

Discipline the child to keep the hands always upon the arms of the chair. Until he learns this valuable lesson, it may be necessary for the nurse to hold

**Control of  
Children's Hands.**

his hands there. This prevents snatching at the instruments, a proceeding which is very dangerous to both the child and the operator. Some dentists, not understanding child psychology, may think that teaching a child to put his hands upon the arms of the chair would cause him to grab them and become rigid. The reverse is the truth, for a child under kindergarten age and often for an older child. The nervous, frightened young child grabs and clings to *persons* and not to *objects*. The minute the child learns that



he must keep his hands on the cool, white porcelain arms\* of the dental chair he instinctively relaxes. An older child may grip the chair, or wring his own hands, but he generally stops when the operator explains that if he will relax, the work will not hurt so much. I tell a very small child that the work does not hurt when he keeps his hands upon the arms of the chair, as it is a well known fact that pain is much less when endured with relaxed muscles.

One day an operator said to a twelve year old, "Jack, relax." As he did not respond she said, "Do you know what relax means?" "Sure I do; it means hang limp."

This disciplining must be done in the absence of the parents. If you do not have their confidence and coöperation, *do not undertake the work*. Just as the teacher must have children under her absolute control in school, for discipline, mental and physical, so, also, must the children's dentist have them under control if he is to be successful. Young children have not as yet had school discipline, and some explanation to the parents of this phase of the work is often necessary.

One of the secrets of success in the management of small children is to treat them as if they were grown up. After the first visit, the child of over three is expected to come alone from the waiting room, down a hall, and into the operating room. I am often greeted with "Oh! I'm a big man. I'm not afraid to come in alone."

One small boy coming for his second appointment was dragged in kicking and yelling by his mother, who then left the operating room. After putting in a filling the operator said, "Are you not ashamed to act like a baby, Fred? Will you promise to march in by yourself like a soldier next time?" He promised. At his next appointment he came by himself and said, "I am coming like a soldier this time." His good behavior continued from then on. When discharging a patient he is expected to carry his chart to the secretary, and often some tiny tot will come back and say, "You didn't give me my chart to take to the secretary"; or as some little people call it, "my ticket." This development of self-reliance is very noticeable in the absence of the parent, especially if the child is one of the spoilt baby type.

The coöperation of the child may not only be of assistance in an operation but may occupy the mind of a child. One very nervous five year old boy would begin to kick each time I used the dental engine. I explained that every time he moved his legs the rest of his body moved, too, and

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\*See Chapter "An Office Equipped for Children."

that when his head moved it was dangerous as the bur might hop off the tooth, where it was at work, and somebody might get hurt. Paul answered, "I can't help it, they move themselves." "Then Paul," I remarked, "next time they kick just give them a good slap and see if they won't behave." He sat more quietly, so I continued his work and had forgotten the conversation when suddenly I heard a loud slap, which greatly amused both the nurse and myself. Trying to keep a sober face, I asked Paul what had happened and he answered, "My legs wouldn't keep still so I just made them." And they did keep still, too, after that. Children are very sensitive to ridicule and if Paul had thought we were laughing at him we would have lost his coöperation in disciplining his unruly legs. You can laugh *with* children but never *at* them except as a spur to their pride. Occasionally, an undisciplined larger child will come into the operating room and begin to misbehave, when there is a well-behaved small child in the other chair. In such a case if you laugh at him because he is so much more of a baby than the little girl who is having her teeth filled, it frequently makes him ashamed and increases his good behavior and self control.

Treating an older child as a man, asking his opinion, deferring to his judgment as to what he should think, would react under certain conditions as a prod to his pride. With a child over six, I try to impress upon his mind that he is an individual and that his teeth are his personal possessions. If they are destroyed or lost through his carelessness, it is his loss and he is the only one that will suffer. I tell him that he will be handicapped through life if his teeth are in such an unhealthy condition and that he will not grow to be a large, strong man.

The ambition of nearly every boy to be an athlete is a great spur to his pride in doing everything possible to build up a strong, healthy body. In the same way girls may be made to understand that no matter how beautiful they may be in every other respect, eyes, hair, etc., if their teeth are ugly, because of neglect, they can never grow into beautiful young ladies, which is generally their ambition. If they insist upon eating candy and destroying their teeth, their digestion will suffer, their skin will become cloudy and rough and their eyes and hair will lose their shine and sheen.

You can say to the child, "If you do not masticate your food and brush your teeth properly you know you will get cavities in your teeth." His reply is "Yes." Then you say, "If you get holes in your teeth who is going to suffer if there is pain in filling them?" To the mind of a normal child this of course is unanswerable.

With the precocious child it may be necessary to pursue different tac-

tics. Where he has been told at home how much he will suffer if his mouth is neglected, much more may be gained if the operator will hold before his imagination a picture of the benefits to be derived.

In working for a child the operator must be very alert to signs of fatigue, pain or fear. If there is increased restlessness, or if the child appears to be suffering unnecessarily, it is wise to curtail the work, call the condition of the child to the attention of the parent and suggest mild home remedies, such as a laxative, simple diet, warm bath and a few hours of daylight spent in bed. In some cases where there is a marked change in the behavior of the child and if there are symptoms of nausea or fever, the child should be sent to the family physician, because such symptoms may be the forerunner of any of the childhood diseases.

**Infectious Diseases.** It is necessary to prevent a child, ill with any disease, from mingling with the healthy children in the waiting room. I believe so firmly in the necessity of this that once during an epidemic of infantile paralysis (poliomyelitis) I advised all the parents of my patients to keep their children in their own yard and not to take them on the street cars or into any public building, and I closed my office until the city was pronounced safe. Particular care should be taken with regard to influenza, whooping cough and measles. I make it a rule that no child be allowed to cough in the waiting room. Occasionally a mother may object and say: "Oh, I'm not afraid for my child"; but my answer is: "I am responsible for the children under my care and I cannot conscientiously see them subjected to contagion." It is mothers like the above who refuse to report disease and who let their children, when sick, be amused by the healthy children in the neighborhood, little caring that the neighbor child may gather the seeds of disease that will shorten and embitter his future life.

**Children's Tastes to be Considered.** In studying the child, try to find what appeals to him most. Possibly he is fond of animals and you can have a conversation about the teeth of his pet dog or cat. One little girl under three insisted that I try each instrument upon the mouth of a fish and the bill of a duck and then was quite willing I should use it in a cavity in her tooth\*. In this way she was impressed that it would not hurt her.

Another little girl continued to cry during operations no matter how I tried to divert her, until her sister told me she was fond of cats. I had a china cat about an inch long which I told her she could hold in her hand if she would be good. From that time on she submitted to the necessary

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\*The animals were of celluloid and had been sterilized.

operations without complaint, and, while working, I told her all the stories of cats and kittens I could think of or invent. A small boy was given a little tiger to hold. The operator said, "If you are brave enough to hold a tiger you are not afraid of a little buzzy bee," as the bur is called in our office. Many children may have their minds diverted in this way and a large stock of animals of celluloid, wood or pottery are indispensable, both in the waiting room and in the operating room.

The voice is one of the best instruments in our equipment for handling young children. They are as susceptible to its variations as are animals. This is another reason for excluding parents from the operating room. An excitable parent, who keeps raising her voice, excites the child. The exercise of crying, increases the circulation of the blood, and this intensifies the pain if there is pulpitis.

**Stories for Children.** Stories told during an operation have a very beneficial effect. Under three years, stories such as "Goldilocks and the Three Bears," or "The Little Red Hen," simply told, will generally hold the attention; but after that age tales told in rhyme, such as those found in "The Giant and Other Funnyland Stories"\* have, in my experience, brought the best results. One six-year-old said, "I don't feel the 'picks' and the 'buzzy bee' when you tell me a story." One of the stories beginning, "Oh, the soldiers are never afraid,"\* is long enough to hold the attention while a cement filling is setting. This is a great advantage, as the sustained interest checks the saliva which, in a nervous child, may be so increased in flow that it interferes with and prevents a successful operation. Well told stories will linger in the mind of a child for years and I often have a boy, coming for oral prophylaxis, ask if I will repeat some of the stories I told him when he first came—then only a tiny child. Children often bring their little companions for dental work so that they can hear the stories. The child's mind is very open to the suggestion that the work does not hurt while he is listening quietly to the story. As he is relaxed and his mind is occupied with the story, his imagination has no opportunity to conjure up fears that poison the blood, and so he does not suffer.

**Rewards for Children.** Children like rewards and can often be kept quiet while being worked upon by the promise of a present at the end of the appointment. The books gotten out by the Metropolitan Life Insurance Company, Lavis, Colgate and other manufacturers, and even the little books by Nutro Health Bread

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\*From "*The Giant and Other Nonsense Verse*," Albert W. Smith. Publishers Andrews & Church, Ithaca, New York.



Company all play their part. This brings to mind the story of a small boy. In the pre-war days when two small celluloid dolls only cost one cent, I used them to reward the good behavior of small girls. One day the sister, Mary, had been given a doll which she lost on her way home, so I gave her another one after good behavior during the long appointment. When John's simple filling and prophylaxis were finished and he was about to leave he said, "You always give Mary something when she comes." Taking the hint I gave him a little red box. At his air of disappointment I asked if he did not like it. Pointing to a collection of Indian weapons decorating the wall he said, "I would prefer the bow and arrows."

**Importance of  
Early Impressions.**

The first few appointments should be short, not exceeding fifteen minutes. The first two or three at least, should always be painless; because, after the impression that dental operations do not hurt is fixed upon the mind of the child, little difficulty will be encountered. His attitude will be determined by his first few experiences, and after that a single painful experience will only be an incident; whereas, if the painful experience comes first, his attitude would be one of fear toward all dental operations. This is particularly true with extraction, which should rarely be undertaken until a favorable attitude of the child toward dental work has been established.

After the child has become accustomed to the work, the period may be lengthened to one-half hour or longer, although it is seldom wise to work longer than that for a young child who soon becomes weary. With weariness an element of fear creeps in, making it more difficult to work at the next appointment. Never work so long, for a child, that his courage breaks down.

**Correct Hours for  
Appointments.**

With many children a morning appointment should be made, as their resistance is much greater then than after they are tired from a day of play, or attendance at kindergarten or school. This is especially true of the nervous or delicate child for whom it is very unwise to operate when his courage and resistance are greatly lowered. Difficult work, such as the preparation of permanent teeth for gold inlays, or the treatment of root canals in permanent teeth, should never be undertaken after school hours, because the vitality is at too low an ebb. It is a well established fact that a child is at his best between ten and twelve in the morning, and between one-thirty and three in the afternoon. This is to be kept in mind when making appointments for children who are physically below normal. When a young child having several abscessed deciduous teeth, is brought to me, and if his resistance has been appreciably lowered, it is often necessary to have

his parents take him out of school, keep him out of doors in the sunshine, and give him a very nourishing diet, until the teeth begin to respond to treatment.

When many operations are necessary for a young child, it is often wise to complete only such operations as teeth involving pulp treatment and the filling of the largest cavities, so that he can masticate with comfort, and then give him a rest of from two to six weeks before filling the smaller cavities.

In conclusion let me emphasize again, that everything should be done to *gain* and to *keep* the confidence of the child. The parents must not be allowed to deceive their child with regard to dental operations; and, in all dealings with the child, the dentist must be calm, firm, truthful and kind.

## CHAPTER II.

### Diagnosis.

During the first visit to the office, show the child the mouth mirror and tell him you wish to make a picture of his mouth so that his mother and father can see how it looks. It is the greatest mistake to look at one or two teeth, at the request of the parents, instead of considering the mouth as a whole. I make a practice of not accepting a patient, except to give temporary relief from pain, unless the entire mouth is to be made comfortable for mastication. A partial examination leaves the impression upon the lay mind of the lack of importance of keeping the mouth healthy and the teeth properly functioning.

Indecision upon the part of the operator during this examination leaves a doubt in the minds of the parent and the child as to the ability of the operator to give relief. Many a case requires study as to the best course to pursue, but a frank, clear explanation of the facts to the parent will gain his confidence. Many cases require the aid of the radiograph before a final diagnosis can be made, and we should never hesitate to use this valuable aid in diagnosis. Many of my patients, under three years of age, have been sent to the radiographer. Personally I do no radiography myself as I believe that until children's dentists become more numerous they have no time to spend in any other work than that in their special field.

Make as careful a diagnosis as possible, going over all the teeth and marking a chart so that the *secretary* may have something upon which to base an approximate estimate of the work, the time it will cover, and some idea of the cost. This will also enable the operator to begin work without delay at future appointments. At the first appointment, also observe the occlusion of the teeth and any habits of lip, tongue, fingers or posture during sleep, (Figs. 5, 6 and 7) which may lead to malocclusion.\* Examine the soft tissues of the mouth and chart indications of soft gums or gingivitis. Note habits of mastication and whether the teeth and tongue

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\*See Chapter "Prevention of Malocclusion."



Figs. 5 and 6. Two views of malocclusion due to thumb sucking.

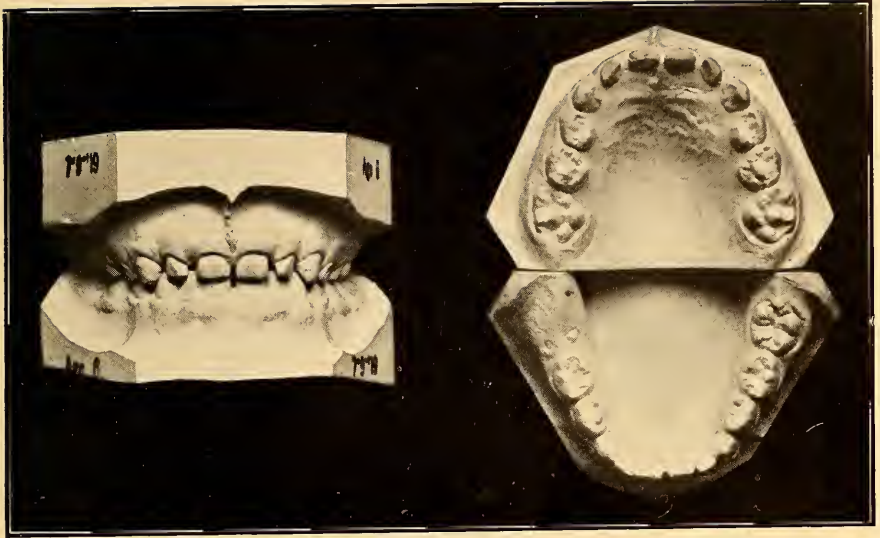


Fig. 7. Malocclusion due to bad habits.

are thickly coated through the use of soft, oversweetened food. The general physical condition of the child should also be noted.

It is easy at this time to show how caries in a simple cavity will progress into a compound cavity and from that into a pulp exposure, leading in a short time to an abscess; and when the length of time and cost required to treat diseased pulps is explained, very few parents are so short-sighted as to refuse to have the entire mouth put into good repair.





Figs. 8 and 9. Good teeth in perfect occlusion. Child six years old.



Figs. 10 and 11. Child of five years—ten teeth with dead pulps.

The condition of the mouth of a child of three to seven years has a wide variation, from the perfect mouth with clean, shining teeth in perfect occlusion, growing interproximal spaces, firm pink gums, and a clean, healthy tongue, (Figs. 8 and 9) to the mouth with darkly stained teeth

thickly coated with debris of food and mucous plaques, with many of the teeth broken below the margin of the gums, (Figs. 10 and 11) filled with decaying food, the gums spongy and bleeding, the area over the dead roots hyperemic and exuding pus from several openings, and the tongue white with a thick coating not infrequently dotted with one or more bright red areas of inflamed papilla. Some of the extreme cases may present a condition of acute stomatitis that will prevent any work until such a condition is overcome. These cases should always be referred to the family physician, or if the parent prefers, to the pediatrician, and told to return in a week. If in examining such a case, abscessed teeth are found, open these teeth to give free drainage of the pus.

### Various Conditions Found in Children's Mouths.

In this wide range of conditions in the mouths of children there are many variations.

I. There is the class where a child of a year or older presents with black stains at the cervical margins of the teeth, a few of which may have deepened into cervical cavities. These are nearly always found in the mouths of infants raised on the bottle, where the food is too sweet or starchy.

One patient presented an extreme case of this sort. She was a well-cared for, healthy, normal child at one year of age, when, because of earache, she fell under the care of a physician who decided that milk is a dangerous food for infants; so she was fed upon malted milk, barley sugar candy, a *glassful* of orange juice a day and soft mushy foods.

When she was referred to me at the age of two, she was in a highly nervous state, would not sleep at night and had begun sucking her thumb. She was suffering pain from many small cavities which pitted the enamel. After much persuasion, she let me paint the teeth with nitrate of silver, which soon rendered them so comfortable that at a subsequent appointment they were given a thorough polishing. She was at once referred to a pediatrician who gave her milk, reduced the orange juice and carbohydrates and increased the vegetables and hard dark bread. In a short time, her health was normal and she stopped sucking her thumb. After two or three applications of silver nitrate I was able to prepare and fill the larger cavities with cement. During the year and a half that she has been under my care she has come for monthly prophylaxis. The cement fillings which were put in under the most adverse conditions have been gradually renewed.

Being so young I hoped she might overcome the malocclusion due to

thumb sucking. I showed the nurse how to press upon the anterior portion of the mandible. Jane became so interested in this exercise that she often says, "Push harder, Nana, so my teeth will look nice."

In her case we shall use silicate cement in the upper cuspids as soon as she can be kept in the chair long enough at one appointment. Here is a case, and there are many such, where it would be folly to use the rubber dam to protect the teeth when filling with silicate. The field of operation must be kept dry with napkins and cotton rolls.

## II.

A second class is where early death of the pulps of several of the teeth has resulted from bottle feeding. These children are often brought in between the tenth and twenty-fourth month, with the pulps in all the incisors dead or dying, and some of the teeth broken below the gum.

Years ago I saw a Russian infant of eighteen months where most of the teeth were in this condition. There were many signs of malnutrition and the child was suffering from stomatitis. The lips were thick and swollen, the color of the face was bad and the child kept up a constant fretful cry. The tissues around the teeth were badly swollen and the slightest pressure caused pus to exude. The tongue was swollen and thickly coated. Upon inquiry as to diet, as the mother could not speak English, the father explained that the child cried all the time for *candy* and *ice cream*. When I urged him to consult a physician for a proper diet he evidently lost confidence in me as I did not see the child again.

## III.

Cases of scurvy must not be mistaken for stomatitis. Several cases of true scurvy have been brought to me. These infants suffering from scurvy have been between the ages of ten and fifteen months. The following is the history of one of the cases.

Madeline M., ten months old.\* She was brought for treatment February 23d. The history was that she was bottle-fed and during the first three months there was severe malnutrition. Then for four months she had been very well and had gained in weight and strength. When dentition began at the seventh month, there was a general disturbance of the system and colic, tenderness of the joints and swollen gums, which had increased up to the time when I saw her. Examination of the mouth disclosed dark, inflamed and swollen gums nearly covering the six erupted incisors, with the area over the erupting lower lateral incisors a dark purple. The child was suffering with painful joints, particularly one of the innomin-

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\*"Pathological Conditions Found in the Mouths of Some Children," by M. Evangeline Jordon, D.D.S., September 7, 1915. *Dental Items of Interest*.

ates, and was also suffering from colic. It was a typical case of scurvy. The child had been under the treatment of an osteopath for three months, but no change had been made in her diet and there had been no improvement in her condition.

I prescribed an addition of orange juice to the diet, as no fruit juice



Fig. 12. Loss of space due to early extraction of second deciduous molar.  
The result of candy eating in babyhood.

was given. Locally the mouth was to be swabbed out with boracic acid and the gums gently massaged several times a day. I saw the child in two weeks and there was great improvement. March 16th, when she made the last visit to the office, the gums were normal and nearly all tenderness of the joints had disappeared. March 19th the mother wrote me: "Baby is doing fine. Has gained one pound in two weeks and her recovery has been very rapid. Her legs are entirely over their sensitiveness and her mouth seems to be in excellent condition. She is cutting two more teeth and does not seem to suffer much distress."

Since the studies of deficiency diets in later years, much has been done to correct faulty bottle feeding, and few such cases will be seen at present.



IV. The fourth class is where the child presents with white, apparently clean teeth and a whitish tongue. Signs of anemia are generally present. When the teeth are painted with a disclosing fluid the parent is greatly surprised at the amount of deposit adhering to the teeth. After a prophylactic treatment is given the teeth, many small approximal cavities will be found.

V. The fifth class is the child with healthy anterior teeth who has exposed or abscessed pulps in the second deciduous molars, as early as the third or fourth year. These are found in the mouth of the child who is carefully watched until he is old enough to run about and talk, when he prettily begs his father for candy. The sugar packs under the flaps of gums over the erupting second deciduous molars and the enamel is disintegrated before the teeth are in occlusion; hence these teeth are often lost before the eruption of the first permanent molars, allowing them to drift forward and the crowns to tip toward the mesial. (Fig. 12).

VI. Perhaps the most difficult class to manage, both in determining the method of procedure and the management of the child in the chair is the frail child, bottle-fed, who, because of his delicate health, has never known discipline. Such a child of three years is enough to daunt the courage of the dentist most experienced in handling children. You have to manage a fearful mother, on edge at every cry of the child, but unwilling to leave the operating room, and a child who cries most of the time during the work. Many such patients will be found to have one to three cavities *in every tooth*, and probably several teeth will present exposed pulps when the debris is washed from the cavities.

VII. There is a class of well cared for children with sound teeth who come for prophylaxis each month and have a calcareous deposit upon the lingual surfaces of the lower incisors and often over the buccal surfaces of the deciduous second molars. Such children are frequently over-weight and as a rule improvement follows a slight reduction in the quantity of bread and potatoes eaten.

I am often asked, "Do children have pyorrhea?" and I always ask, "What do you mean by pyorrhea?" Many children have soft, spongy gums that bleed easily—a mild gingivitis. In extreme cases pressure upon the gums will show some pus, but exploration will not disclose a true pyorrhetic pocket, because it would not have time to form in a child's mouth, but would surely result if neglected.

I have seen two cases that might be classed as pyorrhea (periodonto-

clasia) in older children much below normal, both mentally and physically, and one case that resulted from an ill-fitting orthodontic band.

The following history is interesting. (Figs. 13 and 14). Walter H., a boy of eleven years came to the office October 14, 1922, with a very loose permanent lateral incisor. (Fig. 13.) His mother first noticed this in August when the gum was inflamed and the tooth slightly loose. She believes that the pressure of the erupting cuspid caused irritation and the



Fig. 13. Walter H. Radiograph October 14, 1922.



Fig. 14. Walter H. Radiograph August 14, 1923.

boy loosened the incisor by working on it with the lower teeth. She took him to a dentist for treatment but there was no improvement; so he was referred to me in October. The tooth was under treatment from October 14th to December 16th, 1922, during which time he was referred to an orthodontist to have the teeth banded, as there was a malocclusion, Class I (Angle). When I first saw him in October there was gingivitis and a little pus could be pressed from around the tooth. His history was that of an undersized baby, bottle-fed on patented food. At five months he only weighed seven pounds. At eleven years, although small, he appears robust. His teeth are well-shaped and strong with no sign of caries, but the enamel of the permanent teeth is blue-white and rough. After the second treatment of crystal violet and brilliant green,\* no more pus was found. On account of the boy's youth and good health it was decided to band the teeth to give them support, and, after all infection was removed, to see if nature would not restore the lost tissues. Early in December, after the bands were in place, the gum tissue appeared normal and continued to have that appearance each month when he came for prophylaxis until the first week in May. At that time he had a fall when he would have lost the tooth had

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\*John Marshall, U.C.

it not been supported. The supporting arch was badly twisted. When he came to the office after the accident there was gingivitis and some pus, which responded to treatment more slowly than in October.

The second radiograph was made August 14th, 1923, at which time the tooth was solid and the cervical gum normal. (Fig. 14).

There is no doubt that in many mouths there are the early symptoms of pyorrhea and that where these conditions are not recognized and treated, after removing the cause, which may be faulty diet, lack of mastication or



Fig. 15. Radiographs of lower deciduous molars filled with silver amalgam.

neglect of oral hygiene, the cases progress to the point where in middle life the teeth are lost. We must always remember that the health of the tooth depends upon the health of the peridental membrane.

### VIII.

The saddest class embraces those children who come with most of the deciduous molars more or less carefully filled with silver amalgam, and an examination of the gums discloses several fistulous openings where abscesses have resulted from ill-considered insertion of fillings. Occasionally, in removing the fillings, cotton may be found, and in such cases the abscesses have assumed such a chronic form that the teeth can seldom, if ever, be restored to healthful use.

Recently a boy, Harrison H., of eight and one-half years was referred by a physician who was somewhat puzzled by conflicting symptoms. The boy had been running a high temperature for ten days and was being kept in bed. The physician inquired about his teeth but his mother replied that he had recently had them all filled. Still being uncertain, the physician referred him to me for an examination. Examination showed all the deciduous molars and the first permanent molars carefully filled with silver amalgam. Both lower deciduous molars on the right and the deciduous second on the left were slightly loose and the margin of the gums was deeper in color than normal, but there was no sign of pus. The sublingual glands were



badly swollen. Upon removing the filling from the loosest tooth I found the pulp chamber filled with cotton, saturated with foul-smelling pus. When the fillings were removed from the other two teeth, exposed and dying pulps were disclosed. On his way from the office he visited his physician



Figs. 16 and 17. Swollen glands due to abscessed deciduous molars.

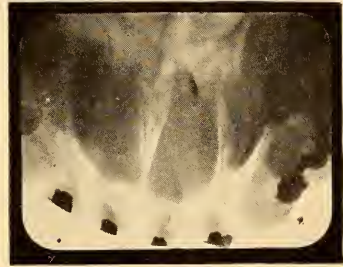
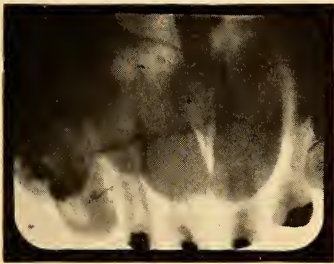
who diagnosed the swollen glands as an attack of mumps and he was again put to bed. On the third day his temperature had dropped several degrees and the swelling had begun to subside. Eventually the physician decided that the swelling of the glands was caused by the teeth and not by mumps. Harrison again visited my office and I sent him to have his teeth radiographed. (Fig. 15.)

The above photographs, (Figs. 16 and 17) were taken at this sitting when the swelling had begun to go down. After studying the radiographs of his teeth I at once extracted the three teeth. He returned in five days with a normal temperature and in a good state of health; the swelling of the glands had almost disappeared, and we at once began putting his teeth in good repair. We found caries under the silver amalgam in his permanent molars; hence modified phenol was sealed in with temporary cement. All silver fillings in the deciduous teeth were removed and two more exposed pulps were found. These were treated and the deciduous teeth were filled with copper amalgam, after which the permanent molars were filled with gold inlays and the incisors with silicate cement. At the present time, six months later, the boy is in the best of health. He has come for prophylaxis each month and his teeth are in an excellent condition.

**IX.** Class nine is where teeth have received traumatic injury. Many children, with healthy normal



Fig. 18. Permanent central injured by root of deciduous central being driven into the follicle of permanent tooth carrying the enamel organ up the side of the root. The accident occurred in the seventeenth month.



Figs. 19 and 20. Radiographs taken June, 1922. Five years before, at the age of two, the centrals had been treated for abscesses and the laterals devitalized.

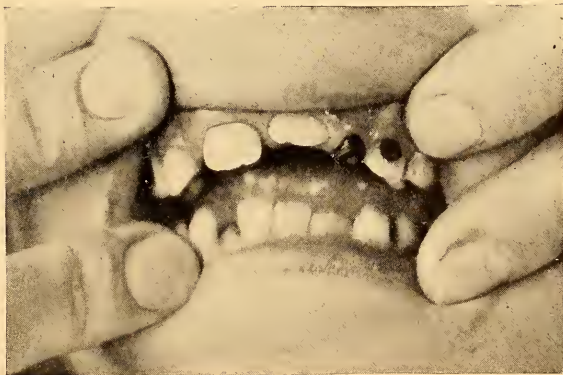


Fig. 21. Photograph of the boy, June, 1923.

dentures, are brought to the dental office as the result of a fall, or a blow which has injured the upper incisors. This condition is very common and ranges from the child of a year who has fallen from his high chair upon his

face, to the boy of ten who has been hit in the mouth with a baseball bat. Roller skates are responsible for many such cases.

When the tooth of a very young child has been driven up into the gum, as a rule the follicle of the permanent tooth is not injured, but one such case was an exception to this rule. In 1911 a boy, aged seventeen months, was brought to the office after a fall which had injured the left central and



Fig. 22. The two upper lateral and right central incisors had dead pulps with badly swollen gums.

lateral incisors. The central was driven up until less than one-third of the crown was showing. The tooth was gently returned to its normal position and the gum treated. The patient was not seen again until 1919 when the left permanent central incisor showed that the root of the deciduous incisor driven up by the fall had injured the follicle of the permanent tooth. (Fig. 18).

Many have the teeth loosened but not broken. In these cases two or three treatments, painting with iodine around the teeth at intervals of two days and bathing with warm boric acid every two hours, are sufficient. If the death of the pulp follows, the tooth must be kept under observation. It may only change to a yellowish tone of color and be shed without treatment almost as normally as if the pulp were alive. If the tooth has turned black it is always wise to open and drain.\* (Figs. 19, 20 and 21).

Many cases come for the first time where an abscess has formed and the gum over the root and the lip are badly swollen. The following is the history of one such case: "Barbara McG., four and one-half years old, applied for treatment May 18th. The two upper lateral and right central

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\*See Chapter "Treatment of Abscesses."

incisors had dead pulps with badly swollen gums. Last September she had a fall and an abscess appeared upon the gum over one of the incisors. In January, she had a second fall and her teeth again were abscessed. There was no caries of the teeth, and the dentists consulted only opened the abscess through the gums without treating the root canals.\*

I drilled through the lingual surfaces of the teeth, gave three treatments



Fig. 23. Bicuspid erupting through opening made by the fistula resulting from an alveolar abscess of a first deciduous molar.

of formocresol, and as all pus and swelling had disappeared I filled the pulp chambers with alum paste and gutta-percha. (Fig. 22).

In August the central incisor became so loose that it was necessary to remove it.

It is imperative to treat these teeth in the hope that the alveolar process, destroyed by the abscess at the fistula, will be renewed, lest the erupting tooth finding less resistance will erupt through the opening made by the fistula. (Fig. 23).

Several such cases have come under my observation, where the upper central incisor has erupted eight to ten millimeters above its normal position. One case was referred to me where the fistula had opened so high that the tooth was hidden in the soft tissues of the upper lip. A surgical operation, followed by the application of orthodontic appliances, was necessary to bring it into its regular place in the arch. If the fall has broken the tooth and the case presents with an exposed pulp, each case may

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\**Pathological Conditions Found in the Mouths of Some Children, Dental Items of Interest*, September 7, 1915.



necessitate a different method of treatment according to the age of the child and the nature of the break.\*

**X.**

The tenth class includes any growth upon the gums not responding readily to simple treatment.\*\*

Such a case should be immediately referred to a surgeon, as there is a possibility of its being malignant. I have seen two cases of sarcoma of the gum in children under the age of ten. In one case the mother took my advice and went to a surgeon who dissected out all of the malignant growth resulting apparently from a chronic abscess of a deciduous molar, and in a few weeks the child's mouth was in normal health. Both bicuspidis on that side were in the proper position in the arch before she was twelve.

In the second case, a boy of nine, showing every sign of malnutrition with most of the teeth in a diseased condition, was referred to me. I tried to convince the mother of the serious nature of her son's condition but did not see the case again.

Fortunately many children now come to a dentist before cavities begin to form in the teeth. In such cases, after the teeth, soft tissues, and occlusion have been examined and charted, it is well to clean the teeth and explain the value of monthly or bi-monthly prophylaxis. If there are cavities but no pulp involvement, wash out the largest cavities and pack with cotton, dipped in carbolized resin. It is not advisable to use warm water in working on deciduous teeth as there are no nerve fibres responsive to a change in temperature. Once in a while a child will complain that cold water hurts, but he is repeating something he has heard his elders say. This can easily be proved by protecting the cavity and spraying a sound tooth, when he will still say it hurts. On the other hand, most children dislike syringing with warm water, and seem to enjoy cold water. Unless there is pressure used, cold water may be sprayed upon an exposed pulp without pain.

After this temporary treatment I send the child and his parents to the secretary to get an approximate estimate, to pay a deposit, and to be given an appointment, which should be in two or three days.

The work of a children's dentist must be so arranged that new cases can be taken under treatment, where necessary, *as soon as they apply for care*, instead of making an appointment several weeks later as is often the custom in general practice. This is as much the duty of the children's dentist as it is the duty of a children's physician to attend a sick child when called to the case.

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\*See Chapter "Devitalizing Deciduous Pulpis."

\*\*See Chapter "Treatment of Deciduous Teeth."

## CHAPTER III.

### Oral Prophylaxis.

Not *filling teeth*, but *preventing the necessity for filling teeth* should be the dentist's work. Let him consider himself successful who can show a clientele where his patients boast that never from babyhood to the grave have they had a stain or a hole in any tooth. *That* is true dentistry, not this tiresome, painful plugging of holes. It is an ideal possible for the majority of people. *Why* is our profession permitting sixty percent to suffer needlessly?

In my years of work for children I have found that nothing is more beneficial than regular oral prophylaxis during the period of development. One of the advantages in beginning with the child in the second year is the opportunity of establishing correct habits of home care of the teeth, as well as breaking up such bad habits as thumb or lip sucking, bad pillow habits and mouth breathing.\* One also has the opportunity to watch the development of interproximal spaces and to teach home exercises that will promote bone growth so that there will be space for the erupting permanent incisors. Perhaps the best reason for monthly prophylaxis is that it takes away that morbid fear of dental operations, which the majority of people seem to have, and leaves only a pleasant memory in the mind of the child. After a prophylactic treatment, one small boy said: "Gee! but they look swell. A fellow can eat now with pleasure."

Tincture of iodine is a very good disclosing agent; it stains the deposits and mucous plaques so that the parent can see whether the child is thoroughly brushing his teeth. By neglected areas one can often tell whether the child is right or left handed. When shown this plain picture of neglect, the parent will appreciate the need of monthly oral prophylaxis and will readily agree to make such frequent appointments for follow-up work.

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\*See Chapter "Prevention of Malocclusion."

### Technique of Oral Prophylaxis.

The operation of oral prophylaxis is very simple. With cotton wrapped around the end of an applicator, paint the teeth with iodine. With a B. Young's rubber cup on a mandrel in a straight handpiece, polish all surfaces with a *fine* quality of flour of pumice. If all stains are not removed, paint and again use the rubber cup. If the buccal or distal surfaces of the second molars cannot be polished with this cup, use a Burlew disk. I have never used mounted brushes, because there is so much complaint of the injury done to the gums, that such a practice for children has a very bad effect upon the minds of the laity. To polish the grooves, fissures, and interproximal spaces, use a wooden shoe peg in a hand porte polisher, being careful not to wound the gum tissue. Syringe freely with cold water to remove any pumice that may have lodged under the margins of the gums, and give a last polish to the interproximal surfaces of the teeth with dental floss. Wash until all pumice is removed. Dip the end of a large cotton roll, two inches in length, into a powder of precipitated chalk, and polish the teeth, by placing the end of the roll upon the gums, then drawing it to the cutting edges. I have found Revelation Tooth Powder very good for this purpose. The taste of it and the massage of the gums seems to be very agreeable to the child. Some of my little patients have named this "Using the marsh-mallow." The final step in the operation is spraying the mouth with a mild mouth wash. As children may fear the spray used with compressed air, it has been named "Using the perfume," and children often beg for it after operations.

### Home Care of the Mouth.

This is a good opportunity to talk to the child of the home care of his mouth, and with most children this instruction must be given in detail, month after month. "It is line upon line and precept upon precept," in prophylaxis, just as in teaching the multiplication table. A dentist, to get lasting results in this phase of the work, must emphasize again and again the value of the teeth, how necessary they are to health, comfort and success in life, and the proper method of brushing them. Childhood is the period in which to establish correct habits of mouth hygiene, and no lesson in life is more valuable. The earlier in life correct habits are formed, the more lasting they will be. A child who has formed the habit of never retiring without brushing his teeth will get out of bed to correct this omission if some unusual occurrence causes him to forget. To form such unbreakable habits must be our aim, although it is very difficult to get some children to brush their teeth regularly.

Not only many children, but many parents, are strangely apathetic concerning the toilet of the mouth. A two year old child should no more



be given a brush and be expected to clean his own teeth thoroughly, than to be given a washcloth and told to wash his own ears, yet that is what many mothers do. Until a child is at least six years old, his mouth toilet at *bedtime* should be performed by his mother or nurse. What we generally find is, as he tells us, "I was so sleepy I forgot to brush my teeth last night." If questioned further, it develops that he had also forgotten the night before last, and the night before that—into dim distance. These weeks of unbrushed teeth are habit forming. Many children go through the motions of cleaning the teeth and accomplish nothing. Unless carefully and repeatedly instructed, the child goes to the bathroom, siezes a brush, wets it, rubs it horizontally across the cutting edges of the teeth two or three times and, "calls it a day's work."

**Superintendence  
of Home Care.**

In dealing with children, the operator should form the habit of inspecting the teeth with regard to the home care at each appointment, chiding or praising the child as the case demands. This must be continuous during the years when they come for oral prophylaxis, and seldom are correct and permanent habits established before the thirteenth or fourteenth year. This is more often the case with boys than with girls. Boys are in such a hurry to play. The instinct of cleanliness is developed much earlier in a girl, although it may not always extend to painstaking oral hygiene. I try to establish the habit of bedtime brushing first, and always emphasize it. One rule we try to fix in the mind of the child is, "Never take off the shoes until the teeth are brushed." I often say to a boy, "Did you brush your teeth before going to bed?" and he will answer, "No, I forgot." "Did you forget and leave on your shoes?" is my next question. Then I explain that it is much worse to go to bed with unbrushed teeth, because they will decay and he cannot get new ones; while if the sheets of the bed are dirty or torn his mother could buy new ones. So he learns the rule, "Never take off the shoes until the teeth are brushed."

The after breakfast brushing also needs much reiteration. The pride of a little girl can frequently be reached in some such way as follows: I tell the child she must brush her teeth after breakfast, and she promptly says:

"Can't. Haven't time. Must go to school." Then I ask, "Do you ever have jam or marmelade for breakfast?" "Sometimes." "Well now, suppose you spilled some strawberry jam on your nice, clean frock, would you leave it there till after school, or would you try to wash it off?" "I'd wash it off. Can't go to school with a dirty frock." "Very well then! Now my Dear, when you get jam on your teeth, it will do more harm than if you spilled it on your frock. You can get a new frock, but you can't

get new teeth, and the jam will spoil your teeth. So if you have time to wash your frock, you must find time to wash your teeth, after dirtying them all up with jam and eggs and porridge and toast and all such things." Usually the lesson goes home.\*

**The Reward System  
at Home and in  
School.**

With a boy you can say, "Do you brush your hair before going to school?" "Yes." "Why?" "Because teacher would speak about it and I would be ashamed." "If she saw that your teeth were dirty wouldn't she be more ashamed of you, to think you would pay no attention to the part she couldn't see?" And Jack answers a shamefaced "Yes." Fortunately children are now questioned, in many schools, as to the home care of their teeth and are given a reward.

The teeth of a careless small boy, who recently came for his regular prophylactic treatment showed a marked improvement. Inquiry disclosed that he had won a school medal for brushing his teeth. This is one of the beneficial results of the work done by the oral hygienist.

The reward system carried on at home is very helpful. Several parents of children who come regularly for oral prophylaxis have followed this system. If there are no holes in the teeth and the operator is satisfied with the daily brushing, the child's mother rewards him with a dollar, but if the teeth have been neglected he gets nothing.

I often have the child bring his brush to show me how he brushes his teeth. Very few children learn easily the correct method of brushing the teeth and gums, and only few parents have learned it. This is not difficult to understand. They are not to be blamed, since there is so much confusion among the dentists as to the best method. I do not presume to give instruction to other dentists. I am only describing the method which has brought the best results to large numbers of children in my practice.

The secretary hands to the parent of each child coming for the first visit a copy of the following very definite instructions for keeping the teeth clean:

**The Correct Way for the Child to Brush the Teeth.**

Have two tooth brushes, one for morning and one for night. Begin with the brush *dry* and use no paste nor powder. Always place the brush on the gums, brushing toward the cutting edge of the teeth—that is DOWN on the uppers and UP on the lowers. This brushes the gums over the teeth and makes them hard and healthy. After this brushing, wet the same brush, using plenty of cold water, and go over them again and again.

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\*Story told by Dr. Ottolengui.

When finished, hang the brush in the sun to dry. The next time use the *other* brush. The object in having two brushes is that one will always be dry to begin with. The teeth should be brushed *after breakfast and before retiring* EVERY DAY.

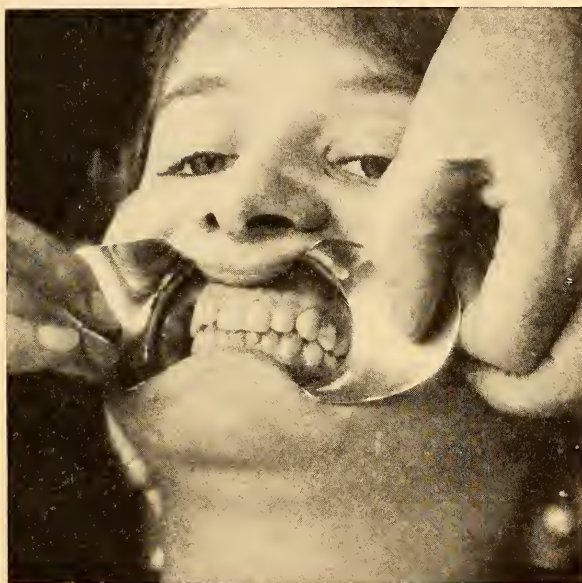


Fig. 24. The result of twelve years of monthly oral prophylaxis, good hygiene and daily use of dry brushes.

There are several reasons why we use neither paste nor powder. Children at first dislike the taste of pastes or of most tooth powders; and for that reason when brushing the teeth, they neglect to give proper care to the molars. Also, when using dentifrices, they begin with a wet brush and thus lose the stimulation of the dry brush upon the gums, which if continued through life has a marked effect in retarding the onset of pyorrhea. Then too, energetic children often destroy the enamel on the labial surfaces of the incisors by using dentifrices containing abrasives. The glycerine which is the base of most toothpastes has a softening effect upon the gums.

**Dental Floss  
Dangerous  
for Children.**

There is nothing at present so dangerous to the health of the soft tissues, as teaching a child to use dental floss. It is, I believe, the cause of more gingivitis, leading later in life to periodontoclasia, than the entire neglect of the teeth would be. I am very emphatic in this

with the children under my care, and you could not wish for harder and more perfect gums than theirs, filling the interproximal spaces, and with teeth in such close contact that food never packs in between them. (Figs. 24 and 25.) If the gums begin to soften, or if food packs between his



Fig. 25. Another patient who has come regularly for oral prophylaxis.

teeth, the child is put upon a liquid diet, for a day or two, until the teeth are in normal contact. He is instructed to massage his gums once a day with campho-phenique until they are hard again, and then more thoroughly to masticate fibrous foods, such as raw vegetables and fruits. This intelligent coöperation of the child in helping to restore his gums to health gives him a new attitude toward the care of his mouth. Bad habits, such as candy or cooky eating, after going to bed, must be promptly broken.

The factor of diet is of great importance and with a child suffering from calcium insufficiency or, as some writers now believe, where the calcium and phosphorous balance is not maintained, the most careful brushing will not prevent caries. Where white lines at the cervical margin of the teeth mark the disintegration of the enamel, radical change must be made in the diet.\*

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\*See Chapter "Effect of Diet Upon the Teeth."



While waiting nature's response to this change, the teeth may be safeguarded by packing carbonate of magnesia around them, after the bedtime brushing, and leaving it during the night. If the child objects to the taste of the magnesia, put a few drops of oil of cinnamon or cloves in a fruit jar; then put the block of magnesia in and keep covered when not using.

**Value of Suggestion.** Suggestion is valuable in teaching habits of oral hygiene. I always try to build up in the mind of the child the great beauty of the teeth and tell him that each tooth is "a perfect pearl," or "a little white fort, and nothing can break through the walls as long as they are clean." I wrote the following story which they seem to enjoy greatly.

### The Little Marble Houses.\*

Once upon a time there was a little city, and in the little city there was a little curved street of shiny, white houses—beautiful, white marble houses, all polished and clean. In each little house there was a little sister, Miss Nerve, and two little brothers, Artery and Vein.

For a long time the owner of the little city kept the white marble houses nice and clean, and all of the children were happy. But after a while, the owner of the city began to eat too much candy and cake and always wanted two big spoonfuls of sugar on his oatmeal. Because it was so sweet, he had to drink two big glasses of ice water and then he would not drink his milk. This was so bad for him that he got to be very lazy, and used to go to bed leaving his work undone. Then weeds began to grow up around the shiny, white houses.

Soon the weeds were so thick and high around one of the little marble houses, that little imps could hide in them. These little imps had hammers and nails and, hiding behind the weeds, they used to hammer away until they made tiny, tiny holes in the little white houses. After the holes were once made, it was very easy for the imps to make these holes larger.

After a while little Miss Nerve used to shiver whenever the air blew in through the tiny holes, but when the holes got larger, she began to cry every night.

As the dirt in the street, which was no longer a nice, clean street, began to blow into the holes, little Miss Nerve became sick and got worse and worse and worse until finally she died.

There was no one to clean up the little house and mend the holes in the walls, as the owner of the little town had grown lazier and lazier, so the wreckers had to come and pull away the house. The owner was sorry, and

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\**Oral Hygiene*, May, 1922.

thought everything would be all right, but when he looked, he found a hole in the next little house.

So he knew that he must get some masons to fill it, or little Miss Nerve, who lived in it would also die. He was so sorry that he had been lazy, that he stopped being greedy, and went to cleaning up his city. He cleaned away all of the weeds, and polished all the little houses so they looked like beautiful pearls. As there were no weeds to hide in, the little imps never tried to make holes in the houses of that little town again. The good fairies were so pleased that they started to build a new house where the old one had stood. Every night they built a little, until after a while a beautiful new house stood where the old one had been pulled away, and it was taller and shinier than the old one.

## CHAPTER IV.

### Reasons for Filling Children's Teeth.

The most important reason for filling the teeth of children is to maintain good health. No untrained person can realize the nervous reactions from a toothache, or the effect upon digestion of poor mastication, due to a single aching tooth. When the pulp is dying, the family usually are made conscious of the child's sufferings, his loss of sleep and poor digestion, all of which lower his resistance to epidemics; but before the active pain makes him annoy them, the average family pays no attention to the child's teeth. It is a duty of the dental profession to awaken parents to the need for children to have dental care before caries can get a foothold. When working with parents, every dentist can seize the opportunity to explain that caries is a preventable disease, if early care is given. This should always be borne in mind when working for young mothers. Dr. B. B. McCollum says, "There is a time in the life of every individual when the proper application of our simplest remedies would prevent the long list of ills described under the head of infective foci." This care consists of proper diet and oral hygiene, both of which are regulated by the mother and not by the dentist.

If caries have already made their appearance he can explain the following reasons for filling deciduous teeth:—

#### I. To Prevent Pain.

A. A normal child never needs to know pain from his teeth. When the deciduous teeth are to be shed, they drop out as naturally as do those of a young dog. (Fig. 26.) If his teeth have been diseased but have been properly treated and filled, the roots will be resorbed and the teeth drop out in the same painless way. (Figs. 27 and 28.) If the roots are bathed in pus, they will not be resorbed but must be extracted. The pain of extraction is the one that children most fear.

B. A child cannot be expected to form correct habits of vigorous mastication when a tooth is sensitive from an exposed pulp, or sore from



an alveolar abscess. If mastication is stopped, the mechanical stimuli of nature are taken away; that is, the pressure of food upon the teeth and gums. The result is undeveloped muscles of mastication and also underdeveloped jaws. A trained observer can always detect, in the unsymmetrical face of an adult, this error in child training.

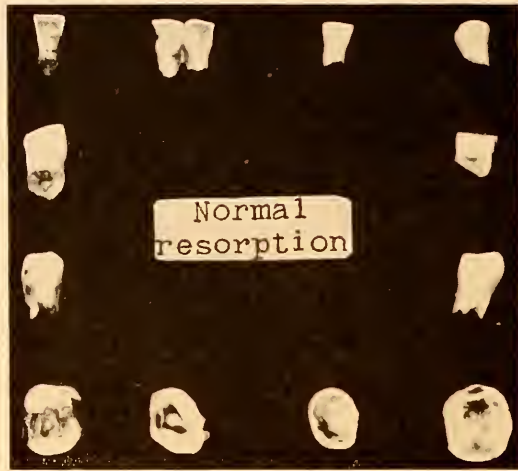


Fig. 26. Normal resorption.

## II. To Preserve a Comfortable Masticating Surface.

The lack of mastication is one of the cardinal sins of the American race. It is as much the duty of the dentist to educate the people to masticate as it is to repair their teeth. Childhood is the period when the habits of mastication must be formed. There are two reasons why good habits are not acquired. First, children imitate their parents in gulping food unmasticated. Second, the majority of children, until the fifth or sixth year are kept upon soft foods, such as cooked cereals which require no mastication.\* Many years ago Dr. Sim Wallace, after reciting a long list of the evils of not masticating, said: "Yet in spite of these terrible facts, the nutritious pap system of feeding children is still gaily advocated by intelligent and responsible physicians." Soft foods and large quantities of sugar, stimulate the rapid development of dental caries.

If the diseased teeth are treated and filled, so that the child has a comfortable masticating surface, the diet can be changed to coarser, harder foods and correct habits of mastication can be established.

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\*See Chapter "Effect of Diet Upon the Teeth."

As a proof of the value of mastication, many of my patients who have begun life handicapped with a system weakened through inheritance have, because of early education and a diet of hard foods, very perfect teeth with well formed jaws.



Fig. 27. Resorption after treatment.

### III. To Prevent Toxic Conditions.

The loose construction of the deciduous teeth, the larger pulps and the more constricted root canals make the disease, from the first break in the enamel to an alveolar abscess with a fistula upon the gum, run a rapid course of a few days or, at most, weeks. (Fig. 29.) When the child has several such teeth (Fig. 30), and it is not uncommon to find all of the deciduous molars involved at the fourth or fifth year—the toxic effect of such conditions cannot be estimated. The foci of infection remain for months, or years, constantly lowering the resistance to disease. Frequently, the tonsils, or the salivary glands, or the lymphatic glands of the neck become involved. At times, the nerves of sight and hearing may become affected. There is always danger of arthritis. Frequently, children with many such foci of infection break their arms or sprain their ankles. "I

wonder if there is not some relation between malnutrition and a faulty calcium metabolism? Or, are such children more awkward because of a



Fig. 28. Second deciduous molar devitalized August, 1916, radiograph six years later.

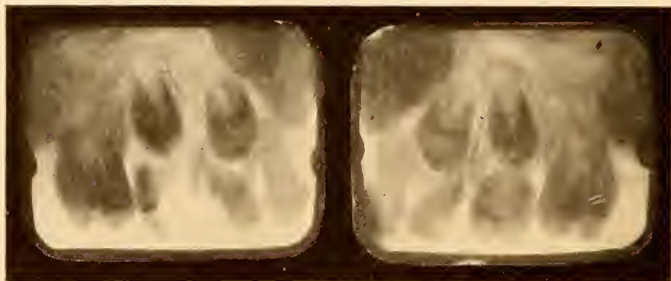


Fig. 29. Diseased deciduous upper molars, causing toxemia.

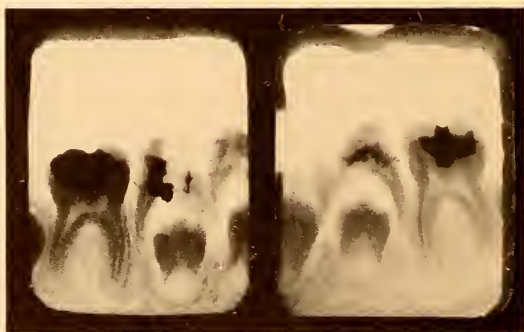


Fig. 30. Diseased deciduous lower molars—right and left side of same mouth—causing toxemia.

lack of coördination due to pathological conditions of the mouth resulting in toxic poisoning of nerve centers?"\*

\**Pathological Conditions found in the Mouths of Some Children*, by M. Evangeline Jordon, D.D.S., *Dental Items of Interest*, Sept., 1916.

#### IV. To Prevent Malocclusion.

A. The moving forward of the first permanent molar is the result of early extraction of the deciduous molars. (Fig. 31.) This often results in a marked overbite and in the lengthening of the incisors. The lower jaw may be pushed into a distal position. It also causes a lingual or buccal displacement of the bicuspid and may retard their eruption. It also arrests the development of the jaws.

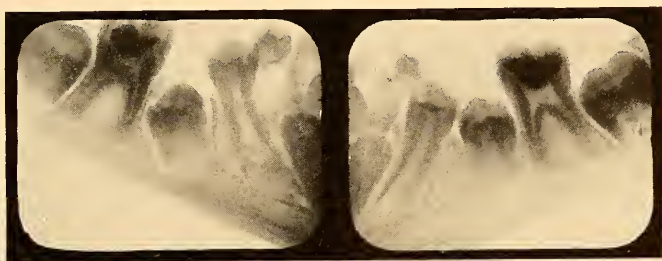


Fig. 31. Moving forward of the permanent molar due to early extraction of the second deciduous molar.

B. The lingual occlusion of one or all of the upper permanent incisors may result from the early loss of the deciduous incisors, with a corresponding lack of development of the maxillæ. This is often the result of bottle feeding in which the food is oversweetened, or in cases where oral hygiene is neglected. If only the roots of such incisors are left, they can be treated and filled and held for five or six years until the permanent incisors make their appearance. (See Figs. 19, 20 and 22.)

#### V. To Preserve the First Permanent Molar.

The first molar, often mistaken for a deciduous tooth and left without care until too late, is the most difficult permanent tooth to restore to usefulness. This molar erupts during the sixth year, but its roots are not completely formed until the end of the tenth year. If during that interval the pulp is exposed, the tooth is in grave danger. The first molar is more often lost from decay than any other of the permanent set. This is a great loss, brought to our attention by Dr. Angle, who calls it the "Key-stone of the arch." Its position, during the shedding of the deciduous teeth, and before the eruption of the second molar, determines the type of occlusion, good or bad, and the resulting contour of the face, beautiful or otherwise. Caries of the first molar may be prevented but cannot be cured. Any work



undertaken to restore lost tissue is only repair and not cure. All the efforts of the profession should be directed toward keeping this molar intact during and after its eruption by educating the laity as to its great importance; and by preparing the child's mouth for its eruption, by treating and filling all of the carious deciduous teeth, and by establishing correct habits of diet, including sufficient fruits, vegetables, milk and hard bread.

The first molar is the tooth most frequently affected by hypoplasia and is often malformed because of malnutrition before birth, or during the child's first year. When not actually malformed the fissures are frequently deep, rough, and very susceptible to caries, often softening before the tooth is entirely erupted. The enamel, too, is often rough and pitted.

## VI. Forming the Habit of Frequent Visits to the Dental Office.

A. One of the most valuable services of the dental profession is prevention. The last ten years have seen a marked change from the reparative or replacement side, to the present prophylaxis attitude. In childhood, prophylaxis is even more valuable than in later years, because there is always the hope of preventing dental caries and, if failing in this, the possibility of limiting operations to small, simple cavities.

B. Perhaps the greatest benefit from follow-up work is that a child need never to know *fear of dental operations*. Only one who works for children exclusively, can appreciate the great value of this fact. Many a set of teeth is ruined through fear of dental operations. A child who comes regularly for prophylaxis, soon learns to enjoy the feeling of the highly polished teeth, with firm, pink gums. He often contrasts his happy situation with that of his less fortunate companions whose parents have unwisely decided that follow-up work is unnecessary. In talking to the parent the dentist must have firmly fixed in his mind the period of eruption and exfoliation of each tooth.

### Eruption of the Deciduous Teeth.

The average—

Central incisors .....	6 to 8 months
Lateral incisors .....	8 to 10 months
First molars .....	14 to 16 months
Cuspids .....	17 to 20 months
Second molars .....	26 to 30 months

**Period When the Deciduous Teeth Are Shed.**

Central incisors .....	6 to 8 years
Lateral incisors .....	7 to 9 years
Lower cuspids .....	9 to 10 years
First molars .....	10 to 11 years
Upper cuspids .....	11 to 12 years
Second molars .....	12 to 13 years

One of the best aids in talking with the parent is Dr. Brady's chart entitled, "*Average Development, Eruption and Absorption of the Teeth*" (Copyrighted 1906). This is perhaps as valuable as any chart to be used for illustrating to the parent, the duration of the deciduous teeth. I have one criticism of this and many tables of eruption. My experience in studying the mouths of hundreds of children, during the replacement of the deciduous teeth, is that the *upper cuspids* are, with rare exceptions, replaced by the permanent cuspids *before* the deciduous second *molars* are shed.



## CHAPTER V.

### Cavity Preparation.

In a general way cavity preparation in deciduous teeth follows the best accepted methods used in the permanent teeth, but, due to the difference in shape and structure of the deciduous teeth, there are some marked exceptions. Many dentists lack success in their operations upon deciduous teeth because of their failure to recognize these differences.

In the deciduous teeth the enamel is more brittle and the dentin much softer than in the permanent teeth. The pulp chamber is larger, giving a proportionately smaller area of hard tissue in which to shape the cavity. One of the greatest differences is the bell-shaped crown with the sharply constricted neck of the deciduous molar when compared with the permanent molar. (Figs. 32 and 33.)

The deciduous teeth will be found in every state of caries, at every age, so that each cavity must be classified in advance with,—

I. The age of the child.

II. The type of tooth, central incisors, lateral incisors, cuspids, first molars, second molars.

While the first permanent molar must be considered in all operations for a child over six, the subject will be taken up in another chapter. Caries often shapes the cavity in a deciduous tooth, and in a large percentage of operations, the dentist is taxed to find retention for his filling after preparing the cavity, and cannot always obtain *correct shape* of the cavity.

In all cavity preparation one rule must be followed, viz. *remove all caries*.

With a child of three, the molars must last respectively seven and nine years. What conservative operator would leave caries near the pulp of a permanent tooth for an equal period of time? The danger is much greater in a deciduous tooth, as the action of bacteria is less obstructed, because the dentin is more easily penetrated. In a young child, the decision wavers between two extremes. First, with a young child, cavity preparation should only be carried to the point of preventing further caries, and not much

attention need be paid to correct cavity shape, because of the tender years of the patient. On the other hand, the younger the child the longer the

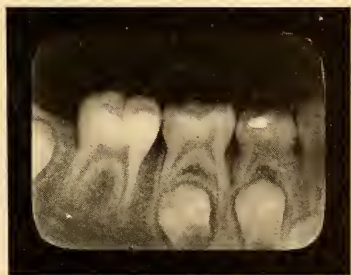


Fig. 32.

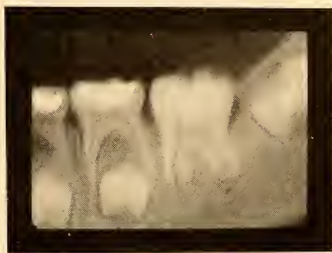


Fig. 33.

Fig. 32. Bell shaped crown. Large pulp.

Fig. 33. Bell shaped crowns and large pulps in deciduous teeth.

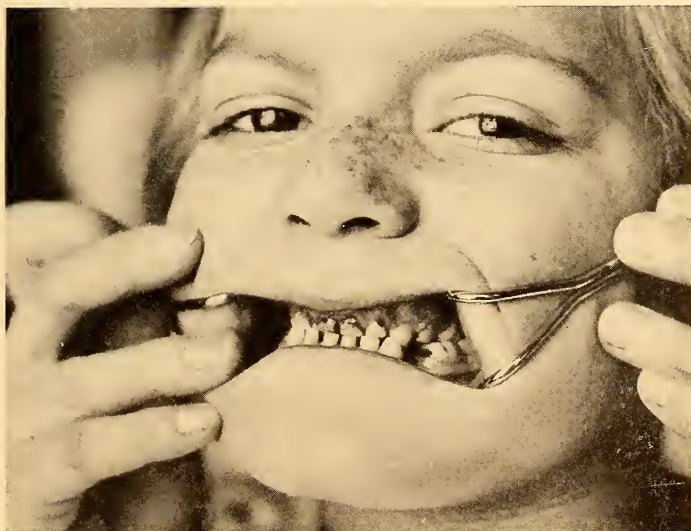


Fig. 34. All cavities in incisors of a young child should be filled.

tooth must last. (An amalgam filling in Fig. 32 has been in five years and has not needed extension).

For these reasons, the parent must be convinced of the need of constant supervision of the very young patient, so that fillings may be watched, and extended when necessary. This is particularly true in fissure

cavities in the molars which, as a rule, are the first cavities to form. The exception to this rule is a bottle-fed baby where the incisors may become carious as soon as they emerge from the gum.

**Cavities in Labial Teeth.** For a child under four, all cavities in incisors should be prepared and filled. (Fig. 34.) Separation is obtained by tying a pledget of cotton dipped in carbolized resin tightly packed into the cavities between the teeth. At the next appointment, remove the caries with a spoon excavator and trim the walls back to healthy, hard enamel, with a round bur, or with chisels.



Fig. 35. Upper central incisors cut wedge shape instead of being filled. Patient over four.

In all operations for young children, except prophylaxis, sharp burs, in the right angle hand piece, will be found more practical than any other instruments, and if handled carefully, need cause the child very little pain.

Most cavity preparation is done with cross-cut fissure burs, or round burs, using small inverted cones No. 33½ or No. 34 to cut retention.

After removing all caries and obtaining firm enamel walls supported by dentin, slightly undercut and square the inner walls of the cavity. Copper amalgam\* is the safest filling material for use in the tiny incisors, as the pulp is less irritated by it than by most filling materials.

For a child over four, where the approximal cavities in the incisors are small, it is often advisable to cut away the mesial and distal walls, giving the tooth a wedge shape. (Fig. 35.) If there is interstitial growth, these teeth are already beginning to separate and the spaces will be self-cleansing. The walls can be easily and quickly cut with small cross-cut fissure burs, and smoothed with small sandpaper disks. If the teeth are sensitive after cutting, treat with silver nitrate.\*\* If the teeth have not begun to separate at the fourth year, the central incisors should be filled.

\*See Chapter "Filling Materials and Their Application."

\*\*See Chapter "Medicines Useful in Operations for Children."

Cervical cavities may be prepared as in permanent teeth. If the central incisor has a cervical cavity it should be filled, even if the mesial and distal walls are cut away. (Fig. 36.)

Unless the teeth are widely separated it is seldom advisable to cut the lateral incisors to a wedge shape, because the mesial surface cannot always be left smooth. When the permanent central incisor is in occlusion, its



Fig. 36.

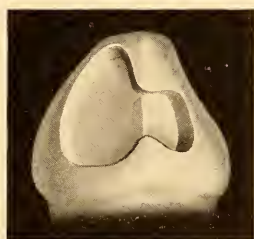


Fig. 37.

Fig. 36. Cavity preparation for cervical cavity in labial surface of incisors or cuspids.

Fig. 37. Cavity preparation in central incisor or cuspid where lingual step is necessary.

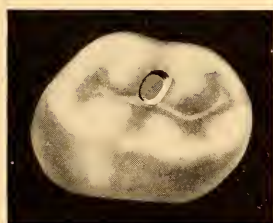


Fig. 38.

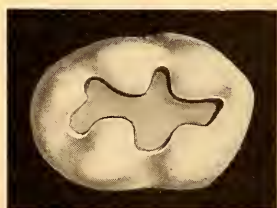


Fig. 39.

Fig. 38. Cavity preparation for small occlusal cavity in molars where no decided fissure exists.

Fig. 39. Cavity preparation for similar cavity in older child.

distal surface may be endangered by the rough surface of the lateral incisor. For this reason it is generally better practice to fill the cavities in lateral incisors.

If the corner of the lateral incisor is broken off, a step must be made in the lingual surface of the tooth to retain the filling. This step should be dovetailed and undercut. Great care must be taken to avoid the pulp. A very shallow step will hold the filling. (Fig. 37.)



The lower cuspid, lost during the ninth year, may be classed with the incisors. The upper cuspid, not lost until the eleventh year, and which normally lies between permanent teeth for more than a year, should be filled. Smooth, contoured contacts, should be built to protect the permanent teeth, as well as the gum tissue, from fibrous foods packing between them. At nine or ten, if the cavities in the cuspids are small, it may be advisable to replace the copper amalgam in the cervical or mesial cavity with silicate cement. The child at this age is sensitive about his appearance, and any improvement the operator can make will gain his gratitude.



Fig. 40.



Fig. 41.

Fig. 40. Preparation of buccal cavity in deciduous molar.

Fig. 41. Preparation of lingual cavity in deciduous molar.

#### **Cavities in Deciduous Molars.**

Cavity preparation differs from the ideal, in deciduous molars more than in the anterior deciduous teeth. For the child under four, simple occlusal cavities, lacking deep grooves, need not be extended, but the caries may be removed from the pit and the tiny cavity filled, as in an incisor, until the child is older, when further extension may be made; however, the tooth may often be shed normally without this. (Fig. 38).

Unless the child over four is coming for regular prophylaxis, cavity preparation should be carried to the end of the grooves in occlusal cavities in the molars, but need be extended only a little below the dento-enamel junction and slightly undercut to hold the copper amalgam filling. (Fig. 39.)

The preparation and shape of buccal and lingual cavities is generally determined by the progress of caries, but the ideal shape for such cavities in permanent teeth should be borne in mind. Preparation of a buccal cavity is shown in Fig. 40.

Lingual cavities are often overlooked, particularly in the lower molars, where they are hidden by the tongue and obscured by saliva. These cavities, which are difficult of access, should be undercut as much as



possible, because the fillings are liable to be dislodged during vigorous mastication. (Fig. 41.)

In the preparation of small approximal cavities, "extension for prevention" need not be considered, if copper amalgam is the filling material used, as the copper salts prevent caries from attacking the margins. If these small cavities are found cervically of the contact point, they may be prepared and filled as simple cavities in the incisors. (Fig. 42.) If, however, the overhanging occlusal enamel wall is unsupported by dentin, there



Fig. 42.

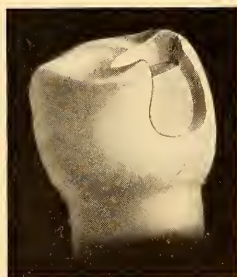


Fig. 43.

Fig. 42. Preparation of small approximal cavity near cervical margin.

Fig. 43. Preparation of approximal cavity that reaches near to occlusal surface.

is danger of its breaking away under stress and the cavity should be converted into a compound one by including the occlusal surface in the preparation. Where the approximal cavity must be converted into a compound cavity, if there is no occlusal cavity, it is seldom necessary to extend it more than five or six millimeters into the occlusal surface, but this extension must be given a definite dovetailed shape. (Fig. 43.)

The principal difference between cavity preparation in deciduous and permanent teeth is to be found in shaping compound cavities in the deciduous molars. This difference in cavity shape is necessary because of the difference in the shape and structure of the deciduous molars. If this point is not clearly understood failure of many fillings will result.

The crown of the deciduous molar is sharply constricted at the neck. In preparing the cavity with a square cervical base, there is a possibility of breaking through the enamel wall; also, if dependence is placed upon the square base for retention, the enamel of the deciduous tooth being so brittle, any or all of the walls may give way under sudden stress, and unseat the filling. For this reason, in all compound fillings the dovetailed step must be depended upon for retention. (Figs. 44 and 45.)

In large compound cavities the operator can seldom reach the ideal in cavity preparation, because of the spreading growth of caries; however,



Fig. 44.

Fig. 44. Preparation of dove-tailed undercut in compound cavities in deciduous molars.



Fig. 45.

Fig. 45. Occlusal view of Fig. 44.



Fig. 46.

Fig. 46. Large compound cavity in mesial of an upper deciduous molar. Also conservative preparation of small cavity in disto-lingual groove. If filled with copper amalgam it is seldom necessary to extend the cavity the entire length of the groove.



Fig. 47.

Fig. 47. Mesial view of compound cavity shown in Fig. 46. Also conservative preparation for small cavity at cervical end of lingual groove.

the ideal should always be borne in mind. A compound cavity (Fig. 46) with an undercut step, might not be successfully filled if a matrix were used. However, in filling with copper amalgam, a matrix should not be used. The teeth should be separated and a wide contact built. In order to tightly fill the undercut, burnish the filling from the cervical margin

towards the occlusal. As the filling progresses, pack with a small, right-angle pointed amalgam instrument. Keep adding amalgam to the cervical portion of the filling, working from the occlusal portion of the cavity, and burnish toward the step. The portion of the filling connecting the step and the approximal part of the cavity, should be as wide as the buccal or lingual enamel walls. All walls of the dove-tailed step should be undercut.



Fig. 48. Two approximal cavities, involving the occlusal surfaces. Prepared as separate cavities, the intervening ridge being preserved for support to the side walls.

In the disto-lingual groove of the upper molar, if the cavity is small, do not extend it the full length of the groove. (Fig. 46). The same conservative treatment is to be followed where small cavities appear at the cervical ends of the lingual groove. Fig. 47, shows the mesial and lingual surfaces of the same tooth illustrated in Fig. 46, and portrays the preparation of the compound cavity, as seen from the mesial aspect, as well as the cavity in the lingual, which has been prepared without extending the groove.

Where a deciduous molar presents with two approximal cavities and a strong median occlusal ridge, it is wiser to prepare the two cavities separately (Fig. 48.) Such teeth are often split from a sudden blow, where the preparation has united the two cavities, depriving the side walls of the support of the intervening ridge.

If these ideals are borne in mind and put into practice, in any but the most acid mouths, a copper amalgam filling should remain and save the tooth until it is shed.

## CHAPTER VI.

### Filling Materials and Their Application.

It is often said that, "There is no difference between filling deciduous and permanent teeth." This I interpret to mean that in operating, the same safeguards must be thrown around the work and the same high standards of procedure must be followed. In this respect it is very true. If it is interpreted to mean that the same materials can be used in the same manner, then there is great exception to be taken to the statement.

**Differences between Deciduous and Adult Teeth.** The deciduous teeth need care from the first to the twelfth year, and the conditions under which the work must be done, as well as conditions of the oral cavity, are entirely different from the conditions confronting the operator from the twelfth year until old age.

**I.** One reason why a dentist, in general practice, finds work in a child's mouth so different from adult work, is that the rubber dam cannot be used.

**Use of Rubber Dam.** The following reasons prevent the use of the rubber dam :

A. The small size of the child's mouth makes the use of the dam difficult ; especially so, if he has a tight, or small orbicularis oris.

B. The saliva of many children is so thick and ropy that applying a dam is very difficult, if all other conditions were favorable.

C. The shape of the deciduous teeth makes it difficult to apply the dam and exclude all moisture. Also, the first permanent molar has seldom emerged enough from the surrounding tissues before the twelfth year, so that the clamp will grasp the tooth below the buccal curve.

D. The application of a clamp is too painful to be borne by any but the exceptional child.

E. Caries of the deciduous teeth in approximal cavities, seldom leaves a tooth margin below which the dam can be carried.

F. The restlessness of the child is a great hindrance in keeping the dam in place after it has been applied.



G. The child often has a very large, restless tongue that greatly interferes in applying the dam and also in keeping it in place.

The use of cotton napkins and rolls (Fig. 49) is sufficient, in all operations that are to be undertaken for little children. Before putting them in place for the first time, explain their use to the child, and tell him that you will need his help. In applying a napkin to protect teeth from moisture in the lower



Fig. 49. Method of using napkin in a child's mouth.

jaw, tell him that "Mr. Tongue" must come up and let you put a napkin under it to keep the medicine from burning it.

The nurse prepares the napkins by cutting number one aseptic dental napkins in half, and separating and piling the amount necessary for a day's use in a drawer kept for that purpose. If the saliva is very abundant a small cotton roll, one and one-half inches in length, may be tucked in over the napkin, between the teeth and the side of the tongue, and held in place with the mouth mirror. If the child is very restless his attention may be held by a short story.\*

## II.

The deciduous teeth are more brittle and less dense (Fig. 50) in structure than the permanent teeth. This fact must be seriously considered in making a choice of filling material.

\*See Chapter "Stories to be Told Children During Dental Operations."



## III.

The pulp chamber is larger (Fig. 51) in proportion to the size of the tooth and the root canals of the molars are more constricted. This must be taken into consideration when using a material that may for any reason endanger the life of the pulp.

## IV.

Except with the unusual child, under five years, *long* operations cannot be undertaken and carried through, with any degree of success, because of the child's unwillingness to sit quietly for more than a few minutes. Even if the child has exceptional self-control, it is often necessary to hold his attention by telling a story.

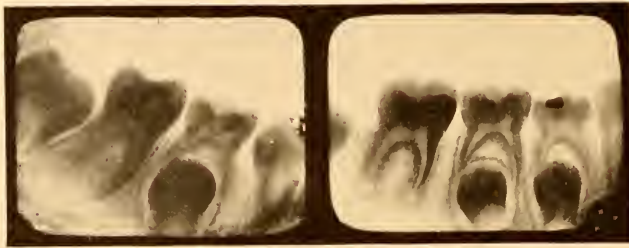


Fig. 50.

Fig. 51.

Fig. 50. The deciduous molars are less dense in structure.

Fig. 51. The pulp chamber is larger and the root canals more constricted. (Copper amalgam filling in first deciduous molar has been in five years.)

## V.

The strongest reason for being opposed to the statement that operations for children are the same as those for adults, is that you are facing an entirely different set of conditions when you consider the environment of your operations. You do not have as allies for the future protection of the filling:

A. Immunity to caries.

B. Good oral hygiene.

Everyone concedes that caries is a disease of childhood. That it is a preventable disease, need not be taken into account when discussing filling materials. That it is a disease that runs an acute course, can be proved by going into any of the lower grades in a school and examining the mouths of the children; most of them filled with broken, decaying roots of deciduous molars.

**Neglect of Oral  
Hygiene.**

Oral hygiene, in spite of the propaganda of the present day, is, in practice, one of the most neglected forms of personal hygiene. How much of this may be due to the conflicting methods of brushing the teeth advocated by the

dental profession; how much to the apathy of the average mother; and how much to the deficient diet of the present day, it is difficult to decide. The fact remains, however, that even after repeated lessons, not one child in a hundred, who uses a tooth brush, properly protects the second deciduous molars, nor the first permanent molars when they are erupting. At the present time, possibly not over one child in every thousand children in the United States uses a tooth brush.

The question of diet will be dwelt upon in a later chapter, but in considering the probable life of a filling, one of the factors that may shorten its service is the soft food and unbalanced diet of the child.

### Materials Available for Filling Children's Teeth.

With these conditions always in mind, let us consider the filling materials available.

#### I. Gutta-Percha.

In its harder forms, like base plate, gutta-percha has no place on the list, for operations on deciduous teeth that cannot be better filled by copper amalgam. The use of base plate gutta-percha, in *large approximal cavities* is almost criminal carelessness on the part of the operator. He should foresee that it will soon become dislodged, and cause a very painful pressure upon the gum tissue. Children are often brought to the office, when such pressure has caused so much pain that mastication has been given up and the gums are swollen and bleeding. In small, occlusal cavities, it might be useful, if it could be depended upon to retain its shape; but where hard food is thoroughly masticated, it becomes worn down, and, as copper amalgam could have been put in with equal ease in the first place, it seems hardly worth while to use gutta-percha at all.

The softer forms of gutta-percha, such as the temporary stoppings, are of great value. Gilbert's stopping is the most satisfactory for use in covering treatments in the deciduous teeth, because of the ease with which it can be applied and removed. It should never be left in the tooth for more than three or four days at a time, for two reasons. First; it wears down rapidly. Second; it may press against the gums and cause an irritation. When necessary to leave longer, or if the gums have been irritated by the stopping, the treatment should be sealed in with temporary cement.

#### II. Cements.

Cement, used in the mouth of a child, can only be considered as a temporary filling. A lack of understanding of its nature in conjunction with environment, explains the non-success in many operations. The saliva in the mouths of most children, acts with great rapidity upon the margins of the cement

filling, and more slowly upon the bulk of the filling. The difficulty in getting a perfectly dry cervical margin, so that the cement adheres to the tooth structure when putting in the filling is another obstacle. An apparently useful cement filling, upon close examination may disclose a leaking cervical margin, where caries, undisturbed by mastication, has penetrated the pulp.

Many writers, of the present day, are advocating the extensive use of various forms of cements without, I fear, prolonged observation of the results of such fillings. Theories must often be abandoned in the face of carefully recorded observations.

None of the cements, except the silicates, has sufficient edge strength to be depended upon for building contours in compound cavities that are to remain longer than a year. Even Fleck's red copper cement, and the silicates, will crack and break away under careless mastication of hard candies, or seeds of raisins.

#### **Black Copper Cement.**

Black copper cement, which one of the educators of the country has recently been advocating as a filling for the permanent molars, and which is often mentioned for use in the deciduous teeth, has less value in children's work than any filling material we have. First; copper amalgam can be used in any cavity where this cement might be used, and is much more easily applied and much more permanent when placed. Second; black copper cement is only *second to nitrate of silver* in its *staining qualities*. Eight or ten years ago, when replacing black copper cement fillings with permanent ones in permanent first molars, I found it impossible to remove the black stain that had penetrated the dentin, giving a bluish color to the enamel. Not wishing to leave in my wake a trail of blackened first molars, I at once began to use white cement, and obtained as good results, without staining these valuable teeth, which in adult life are so often visible. Nothing can excuse the darkening of the first molars, if there is any other way of protecting them from recurrent caries, and, in my experience, there are several ways. The preservation of the first molar is so important, that later in the book I have devoted an entire chapter to the subject.

There is one place where black copper cement *may* be used more successfully than other cements, although I am not thoroughly convinced of the fact, and that is to flow over an erupting permanent molar, *where there are no breaks in the enamel*, to protect the fissures until the occluding tooth is in position.

The cements have a place in children's teeth, but they must always be considered as temporary fillings and should only be expected to remain perfect, at the outside limit, for six months.

**Caries at Puberty.** With both boys and girls, a condition occasionally arises at puberty, that taxes the most optimistic and patient operator. A denture, which up to that time may have been resistant to caries, begins suddenly to break down. Caries of the rapid developing, white type, will be found at twelve to sixteen years of age. Most of the cavities will be approximal, particularly in the bicuspid and molars. Until this period of susceptibility to caries has past, no permanent work can be depended upon to retain perfect margins. These cases are very trying, as such patients, at this time, are very nervous and wayward, often refusing to give the mouth the necessary home care, or to sit patiently for operations. Just what this condition results from it is impossible to say; doubtless many factors enter in. The physical changes occurring during this period have much effect, but some of the other factors must not be overlooked, such as over mental stimulation due to entering high school; or too many evenings spent at the motion pictures; or more irregular diet from the social life with evening refreshments and chocolate drinking. The conditions are usually worse toward the end of the school year.

In such cases, cement is the only resort. Prepare all cavities by packing with cotton dipped in carbolized resin. At the next visit, remove all darkened caries and pack again with cotton and resin. After the second or third treatment of this sort, prepare the cavity in the usual way and complete its toilet. After all caries has been removed, dry the cavity and paint with phenol. Evaporate the phenol with warm air, leaving a lining of minute phenol crystals, and fill with a good cement. Strict attention must be paid to daily oral hygiene and diet. When the disease is under control, which can be determined if the patient comes every month for prophylaxis, the cavities may be gradually filled with gold inlays.

**An Early Experience.** After graduating and receiving my license to practice, I had an experience with cements which I have never forgotten. To tide over the time until the opening of my office, I occupied myself with three persons, connected with my family, who needed work. In each mouth I placed cement fillings, in exactly the same way from the same bottle of cement. Three months later, I worked for two of the patients. The delicate, candy-eating child of eight, for whom I had placed nine or ten fillings, did not have a sign of a filling in her mouth. The second patient, a young lawyer, of a nervous temperament and a poor digestion, had badly washed-out fillings which would not have lasted six months. The third was an electrical engineer, who was helping install a big plant and who could not get to the office until more than a year had passed. The two fillings in his mouth were in nearly as perfect condition as when put in, many months before. This illustrates the



difference in saliva, and the effects of different diets in different mouths. The engineer, living out of doors far from city markets, had the simple, wholesome food that protects the teeth.

As cavity linings in permanent teeth, or as fillings for a few months, cement has a valuable place in children's teeth, where the pulp can be protected from the acid of the cement. It should be used in anterior teeth in many cases until the mouth can be made *healthy* enough to permit the use of silicate cement fillings, or porcelain inlays. It is never wise to do *any permanent work* in a child's mouth until it is *cleaned up* and until the child *learns to give the mouth reasonable care*.

**Silicate Cements.** Silicate cements may be of value in some cases, but great judgment must be used in deciding where they are suitable. I see many silicate cement fillings in first molars. Where the cavity preparation has been shallow, if the grooves have been made in the filling so that the anatomical form is restored and the occlusion is good the thinner pieces break away and caries recur. If the filling is left high enough to protect it from breaking, the occlusion of the teeth may be seriously interfered with—a grave error in view of our present knowledge of the traumatic injuries that may follow malocclusion.

For esthetic reasons you may be inclined to use a silicate in the deciduous anterior teeth of pretty children. Do not give way to such a temptation, if filling large approximal cavities in incisors. In getting enough retention, you will get so near the pulp that, in the majority of cases, its death is sure to follow. The penetration of the acid of the silicate group of cements is dangerous, because of the large tubules of the deciduous teeth, and death of the pulp quickly follows. This will necessitate the treatment of the pulp and often causes discoloration of the tooth. The final results will not redound to your credit. I explain frankly to the esthetic parent, that silicate cement will probably kill the pulp, and that she would better choose between the oxyphosphate cement filling, which must be frequently renewed, and the unsightly but permanent copper amalgam filling.

In small, cervical fillings, in the deciduous upper cuspids, not shed until the eleventh year, a silicate filling is ideal. Occasionally, the same conditions may be found in the upper central incisors. If the mouth is kept clean, these fillings last until the teeth are lost. In some acid mouths silicate cement fillings wash out very soon.

The silicate cements are indicated in small fillings in the permanent incisors, *after the oral cavity has been made clean* by proper habits both of hygiene and diet. After removal of caries, followed by a thorough sterilization, large cavities near the pulp should be filled with cement and left for a few months, when all but a cavity lining may be removed and replaced with a silicate filling.



**III. Silver Amalgam.** Silver amalgam is the most abused and the most disappointing material used in the deciduous teeth. In my practice, its use has, with one exception, been discontinued for the following reasons:

A. It does not protect the hard and soft tissues of the tooth from the reëntrance of bacteria at the margins, as do the black copper salts, deposited around the *copper* amalgam filling.

B. The margins of the tooth around the filling become brittle and break away more readily than from copper amalgam.

C. It requires more retention.

D. When placed near the pulp it appears to cause its death. At least we have more children referred to the office with dead or dying pulps under recently placed silver fillings, than from any other filling material. A few weeks before writing this, a child five years old was referred to the office, from a hospital, where for a week he had been suffering from an abscess near the right ear. Two months previously, three of his teeth had been beautifully filled with *silver amalgam*, but a few days later, the lower right second molar began occasionally to give the child pain. When the molar was opened, there was a free flow of pus, and within two days the child showed such marked improvement that he was taken to his home. The abscess back of the ear, which previously had been lanced, healed within a few days, and the abscessed tooth soon responded to treatment. A silver amalgam filling may appear to be perfect, but a close scrutiny may show a leak at the cervical margin. Upon removal of the filling, an involvement of the pulp is nearly always found.

What can be said of an operator who puts in *one* filling between two deciduous molars, as I have often found? The inevitable follows: As the teeth of the child are more mobile than the permanent teeth, and are constantly shifting their positions, one or both sides of the filling break away. Bacteria carried by the saliva, penetrate the cavities in both teeth; the filling sheltering them, they burrow rapidly to the pulp and cause its death. Frequently, children whose teeth have been filled in this way, will have all eight deciduous molars with exposed, or dead pulps.

The exception to the rule, excluding silver amalgam from use in the deciduous teeth, is in distal compound cavities in the second deciduous molars. In a small distal cavity, in the second molar, where retention can be gained, and all caries eradicated without approaching too near the pulp, and if the margins of the cavity are hard and thick, a contoured silver amalgam filling may be inserted to protect the mesial surface of the first permanent molar. Sometimes a gold inlay may be used instead.

#### IV. Copper Amalgam.

Copper amalgam is the ideal filling and has proved its worth for the deciduous teeth and for the first molar in those cases where inlays cannot be used until the oral conditions improve.\* Even in mouths that are acid, where it wears down rapidly, the copper salts protect the margins better



Fig. 52. Copper amalgam is a valuable filling material for use in deep cervical cavities for young children.

than any other material except cement, and that only protects the margins until it begins to wash out. Copper amalgam will preserve the tooth four or five times as long as cement.

#### Advantages of Copper Amalgam.

The advantages of copper amalgam are as follows:

- A. It may be used where thorough dryness of the cavity cannot be obtained.
- B. It does not irritate the gum tissue.
- C. It may be placed under the margin of a bleeding gum.

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\*See Chapter "First Permanent Molar."

D. It may be quickly and easily applied, and the napkin removed, without waiting for the filling to harden.

E. It may be placed nearer the pulp without causing its death than any other material. This is of great importance in repairing the teeth of the small child of two or three years, where deep cervical cavities (Fig. 52) may be found in the labial and buccal as well as in the lingual surfaces, of practically all the teeth. These conditions are frequently found in the neglected mouth of a child, bottle-fed on a sweet or starchy food, or of a child who has suffered severely from whooping cough, or intestinal disturbances due to an excess of carbohydrates.



Fig. 53. Ditch at the cervical of a copper amalgam filling filled with copper salts which prevents recurrent caries.

F. Copper amalgam needs less retention than silver amalgam.

G. When properly used, copper amalgam has better edge strength than the cements, although it has not as good edge strength as silver amalgam.

H. Its greatest advantage is, that it protects the margins from recurrent caries, better than any other filling material, due to the copper salts deposited in the ditch (Fig. 53) if the filling should pull away from the margin, or if the frail edge of the tooth should break away.

I. It makes a very hard filling and does not give under the stress of mastication.

#### Disadvantages of Copper Amalgam.

Copper amalgam has certain disadvantages.

A. The greatest drawback to copper amalgam is its slowness in setting. Every time a filling is put in, both the child and the parent must be cautioned, that the child must not put anything into the mouth *that day* but *liquids*, and in many cases it is necessary to explain the nature of liquids. It is surprising how often a parent will tell you, when you inquire about a broken filling, that she only gave the child some *soft bread* or a *little fruit*. The list of foods allowed, is

sufficient to keep the child from starvation, as it includes all strained soups, milk, egg nog, plain ice cream and fruit juices. The parent is instructed to give the child a meal of hard food with meat, etc., before coming for these fillings. She is also plainly told that any repair of a broken filling is at her own expense. This increases her vigilance. It is not difficult to get this home care if the need of it is thoroughly understood.



Fig. 54. Copper amalgam fillings in place more than one year.



Fig. 55.

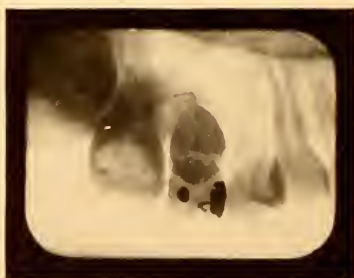


Fig. 56.

Fig. 55. Fused tooth with distinct root canals. Central incisor abscessed; lateral incisor devitalized May, 1917. Radiograph May, 1921.

Copper amalgams in place four years.

Fig. 56. Copper amalgam filling in position six years.

#### **Manipulation of Copper Amalgam.**

The reason why many operators fail in the use of copper amalgam is because they do not understand its manipulation.

The nurse heats several pellets in a spoon, over a gas jet, until the mercury comes to the surface. She then triturates it in a ground glass mortar, with a glass pestle until it is a smooth, even mass. She then divides it into pellets the size of a small pea, rolls each one between her fingers until it is round, and places it in a little dish for the use of the operator. Atmospheric conditions seem to govern the crystallization of copper amal-



gam. On a hot, dry day, in Southern California, it may be necessary to re-heat it and roll it into pellets more than once, in a morning or afternoon. There is no necessity for waste; the amalgam that is left on the table, after the filling is completed, should be placed in a small dish used for the purpose, and re-heated with new pellets when a new mix is made.

The operator, or nurse, takes a pellet twice the size of the cavity, puts

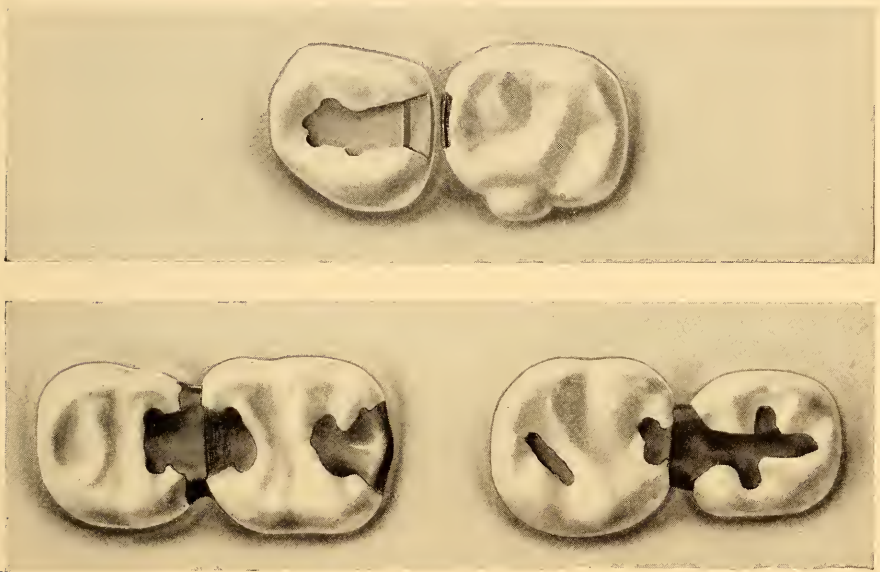


Fig. 57. Technique work showing dovetail step and broad contact. The smaller cavity should be filled first and filling polished.

it into a piece of chamois skin, grasps with a pair of flat broadnosed pliers and presses out all the mercury, leaving a dry, thin wafer. When the cavity is prepared, dried with cotton, and wiped out with phenol, leaving it moist, a small piece of the wafer is put into the cervical portion of the cavity and burnished into the undercuts. Then the surface is indented with a small pointed amalgam plugger, and another piece is burnished in the same manner until the cavity is filled. As the cavity is filled, the mercury will be worked to the top and should be wiped away with a pellet of cotton, and then more of the amalgam burnished in. The cavity should be overfilled, so that the softer part containing mercury can be trimmed away, leaving a hard surface to the finished filling. The filling must be carved to restore the original contours before dismissing the patient.

B. I have heard dentists, evading the use of this misunderstood



material, exaggerate the fact that acid saliva disintegrates copper amalgam. Copper amalgam will wash out where the saliva is very acid, but even under such a condition it will last a year or more. (Figs. 54, 55, 56). I often see patients, who because of their remoteness from a dentist have had no



Fig. 58. Broad contacts prevent the copper amalgam filling from rapid wear and protects the gums during mastication.

dental care for several years, present mouths where new cavities have formed at a distance from the fillings—not continuous with their margins as is found with other filling materials. In a normal mouth a copper amalgam filling will preserve a tooth until it is shed. Copper amalgam is very useful in filling permanent teeth (Fig. 60) of subnormal children and preserves the teeth as no other filling will.

C. Perhaps the chief reason why the general operator fails with copper amalgam is because he prepares and fills the cavities in deciduous teeth as though they were permanent teeth. A compound cavity must always be prepared with a dovetail\* step (Fig. 57) and the contact point must be broadened and built tightly against the approximal tooth.

**Broad Contacts  
Essential.**

The broad contact (Fig. 58) used in filling with copper amalgam is necessary for three reasons.

A. If the copper amalgam filling is contoured in the manner customary in building a silver filling, the contact point rapidly

\*See Chapter "Cavity Preparation."

washes, or wears, away and fibrous foods begin to lodge between the teeth. As these fibers decompose, the disintegration of the filling is very rapid and all contact is lost.

B. When the contact is lost, food packs between the teeth and gradually separates them. The decomposing food and the pressure of mastication causes gingivitis so that, that area is soon too painful to permit further mastication.

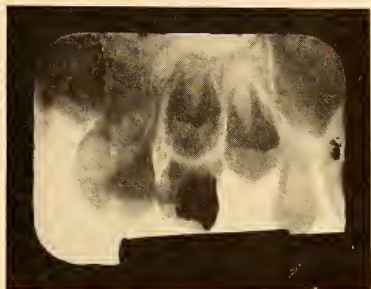


Fig. 59. Copper amalgam fillings in the mesial surface of the second deciduous molar should be placed first so that when the first deciduous molar is shed a smooth surface is left.

C. The broad contact does not wash out and does protect the gums during mastication.

In building this filling, several precautions must be taken.

**Precautions in  
Making Approximal  
Fillings.**

A. The filling in the mesial surface of the second deciduous molar must be placed first (Fig. 59) and left with a smooth, finished surface. When the first deciduous molar is shed, this smooth surface does not interfere with the health of the erupting bicuspid.

B. At least one day must have elapsed before putting in the approximal filling—that is the filling in the distal surface of the first deciduous molar. The wide contact is built upon this filling.

C. Before putting in the second filling, a fine explorer should be used to detect any small, thin piece of copper amalgam which may have hardened under the margin of the gum, and which, if overlooked, may cause enough irritation, by pricking the gums, to simulate pulpitis.

D. The bell shape of the deciduous tooth, often leaves a space at the cervical margin, where the filling rests upon the gum tissue. In placing a large, compound filling, great care must be taken to leave the *copper amalgam* in contact with the gum, *smooth*.

E. In examining compound fillings, during each visit for prophylaxis, if the widened contact extension of the occlusal filling is found to have cracked away, remove it at once, as there is always danger of caries entering underneath the cervical edge of the broken filling and causing the death of the pulp.



Fig. 60. Copper amalgam used in permanent teeth in hyperacid mouth of subnormal child.

**V. Gold Inlays.** The gold inlay in the deciduous tooth is of doubtful value. However, there are cases where its use is indicated for esthetic reasons. Where there are only one or two cavities in the teeth of a young child who has pride in keeping them clean, an inlay does not destroy the beauty, as does a copper amalgam filling. Small occlusal fillings, where strong walls can be obtained, will give very good results, but compound fillings are not so satisfactory. The frail margins of the tooth break away, as the inlay spreads under the stress of mastication, and, after the inlay has been in a year or more, the enamel edges are often chipped and broken.

## CHAPTER VII.

### Medicines Useful in Operations for Children.

In describing the application of remedies used in my offices, I do not imply that other remedies are not as useful in other hands. After testing and discarding many others, I am giving here the results of a few simple, closely observed remedies, easily procured.

**Carbolized Resin.** At the head of the list stand the different compounds of which phenol is a part of the prescription.

Fletcher's Carbolized resin.\*

Use: Saturate one third of a large pellet of cotton with the resin and pack, resin side to the cavity, already dried by cotton. The pellet should be large enough to tightly fill the cavity. The resin hardens enough under moisture so that the cotton acts as a temporary filling without further covering.

The carbolized resin will have several effects: 1. The analgesic effect of the phenol reduces the pain. This is the best toothache remedy we have found. 2. It protects the pulp from contact with foods that might produce pain, such as sugar or salt. 3. The phenol loosens the carious dentin so that often the entire mass may be lifted away from the healthier dentin, sometimes disclosing an exposed pulp. I have often heard it advocated to leave this tough, leather-like mass of caries undisturbed, and, after treating with nitrate of silver, to insert a filling. My experience is, that such a pulp is already infected and its death is sure to follow, if it is not amputated. 4. In devitalizing, or in preparing a tooth for pulp amputation, it is *absolutely* essential that carbolized resin be packed in the cavity for at least twenty-four hours before applying the medicament. There is *no pain from* the action of the *arsenic* if the resin has remained in until the devitalizer is used. If by chance there is pain, it is due to neglect in this step of the operation. The history of one case of this sort made an impression I can never forget. Both upper first deciduous molars, of a

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\*To be obtained at the dental depots.



delicate, nervous child, were to be devitalized. She returned after a preliminary treatment of the resin, with the cotton out of the left tooth. As they were hurrying me to finish the work before they left town, I sealed the devitalizer in both teeth. Late in the evening I was called to the telephone by the anxious father who told me that Dorothy was suffering very much with a toothache and could not get to sleep. I asked where the pain was located and was told, the left upper tooth where a pink filling had been put in that day. I prescribed a warm bath, a glass of warm milk, and half of a five-grain asperin tablet. The next day the pulp in the right molar was removed without pain, but on account of its hyperemic condition, the pulp in the left molar, had not fully responded to the arsenical treatment, and some pain was experienced by Dorothy during its removal. 5. The swelling of the cotton separates the teeth. 6. The swelling cotton also pushes away the soft tissues, which are often bleeding and swollen, overhanging the rough, broken cervical margins of the cavities. Where there are approximal cavities, use a very large pellet and pack between the two as though it were one cavity. Carbolized resin is indispensable in working for children and should be kept packed into all large cavities until they are finally filled. In packing a cavity, the excess of resin must be carefully wiped away with moist cotton, as some children object to the taste. However, they soon forget it, especially if the mouth is immediately sprayed with an agreeable mouth wash. The child must be made to promise not to chew gum or eat candy as either the gum or sticky candy will pull out the cotton. The cotton should not remain over two or three days, when the margins of the cavities may be trimmed with a chisel, the loose caries removed with a spoon, and the dressing renewed. I usually put cotton into two or three of the largest cavities. At the next appointment the teeth will be separated and the gums will be pushed back, giving a clearer view of the cavity. There is less bleeding of the gums after this treatment, than with any other method of gaining separation. Phenol is a good analgesic, and after its application carious deposits may be removed with little pain. I may repeat this treatment several times and feel more certain of the health of the hard tissues after removing the part darkened by the resin.

**Phenol Compound.** Phenol Compound (Lilly), or modified phenol.

Use: If the cavity is shallow, if an exposed pulp is very sensitive to touch, or if the next appointment is several days away, dip a small pellet in modified phenol, place a larger dry one over it, and flow in temporary cement to fill the cavity. If the cavity is very shallow, flatten out a small pellet, press to place with dry cotton, being sure that the margins of the



cavity are dry, and flow the temporary cement directly over the medicated cotton. The operator should aim to relieve the child of any pain from the first visit to the office.

This method is of great value in preparing cavities in the permanent molars for nervous children from seven to ten, and is about the only way to handle operations for a mental defective even older. Children using an excess of carbohydrates often have unsuspected pulp exposures in tiny, innocent-looking cavities, particularly in the upper first molars. In such cases the modified phenol is sealed in for a few days and then removed and the cavity preparation is continued until a painful area is reached, when the treatment is renewed.

**Phenol Sulphonic.** Phenol-sulphonic.

Use: Wrap a few films of absorbent cotton around a smooth broach and carry it as far as possible into the opening of a fistula to cauterize and stimulate healthy growth of the tissues around the abscess.

**Campho-Phenique.** Campho-phenique.

1. After the treatment of phenol-sulphonic, use cotton dipped in campho-phenique as a drain to keep the fistula open until it heals from the bottom of the abscessed area.

2. Campho-phenique is a valuable remedy with which to have the patient massage the gums at the first indication of gingivitis.

**Phenol.** Phenol.

Use: 1. Much of the success in the use of copper amalgam is due to sterilizing the cavity before placing the filling. Dry the cavity and wipe with a pellet of cotton, dipped in phenol. Put the first piece of wafered amalgam in the center of the moist cavity and burnish toward the edges, using considerable pressure. This forces the phenol into the tubules and destroys any lurking bacteria.

2. Before filling with cement, dry the cavity, wipe out with phenol and evaporate with air. This prevents pain from the acid of the cement.

3. In trimming overhanging flaps of gum tissue from partially erupted teeth, paint with phenol before cutting, and little pain is experienced by the child.

**Tincture of Iodin.** Tincture of iodine.

Use: 1. Where there are inflamed gums, paint with iodine.

2. Where there is an inflamed condition around a fistula, use iodine upon the cotton drain and also paint the inflamed area.

3. Before and after devitalizing, paint gums if they are inflamed.

4. As a discloser when cleaning the teeth, paint with iodine.

**Formocresol.****Formocresol.**

Use: 1. In the final treatment in devitalizing a deciduous pulp, seal in formocresol for two or three days, to sterilize and harden the tissue left in the root canals.

2. In the treatment of an abscess in a deciduous tooth, seal in formocresol for from one to three days, and renew this treatment until the abscess is cured.

3. In amputating the pulp in a first permanent molar, use formocresol to stop the hemorrhage and to sterilize the stumps of the tissues left in the root canals.

**Alum Paste.****Alum Paste.**

Use: Filling for pulp chambers of treated deciduous teeth.

After trying many different preparations for filling the pulp chamber of the deciduous tooth after treatment, I finally decided to use a paste recommended by Dr. Theodore Sodenberg of Sidney, N. S. W., in the early nineties, for use in permanent teeth, and for many years I have used nothing else. For convenience we have named this:—Alum Paste.

℞ Alum. excic.,  
 Thymol,  
 Glycerol,  
 Zinc oxid.    a.a.3j;  
                   q.s. to make stiff paste.—M.\*

Calcium phosphate has been substituted for the oxid of zinc in Dr. Sodenberg's prescription.

Add 1½ drams glycerin to alum and thymol. Add enough prec. calcium phosphate to make paste of desired thickness. Allow to stand several hours and incorporate remaining glycerin.

This can be made up by any druggist. If it hardens, mix it with a little more glycerin, until a small portion can be taken up with an instrument and placed in the pulp chamber. Pack it to place with cotton, and add more until the pulp chamber is half full; then fill with white temporary stopping, for one or two days before completing the operation with copper amalgam. The pressure of mastication will press the stopping into the pulp chamber, pushing the paste ahead and causing it to fill the root canals.

**Devitalizing Disks.**

Devitalizing Disks. J. Bird Moyer Co., Philadelphia, Pa.

Each disk contains one-fiftieth of a grain each of arsenic and procaine.

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\*Prescription of Dr. Theodore Sodenberg. Kirk's *Operative Dentistry*.

Use: Dip one disk in phenol compound; apply directly over the exposure, seal with pink temporary cement and leave twenty-four hours *only*.

**Nitrate of Silver.** Nitrate of silver, preferably Howe's has a limited use, in very shallow cavities, but too great dependence must not be placed upon it. Cavities treated with it are at best only temporarily immune to caries.

These are the *principal* drugs in common use in my offices.

## CHAPTER VIII.

### The Devitalization of Deciduous Pulp.

The dental journals publish articles on management of children's teeth in which such a statement as the following will often be found; "Arsenic should never be used at all in deciduous teeth. If the pulp must be devitalized, it can be accomplished by the repeated application of phenol, ammonia, or formocresol in cases of putrescent odor."\* Twenty-five years ago I started with that theory. "*Repeated* application," of the above and other remedies proved so unsatisfactory that I tried pressure anesthesia. With young children where the rubber dam could not be applied, the lower teeth could seldom be treated in this way, because of the restlessness of the child and the copious flow of saliva. Pressure anesthesia, to which I have occasionally resorted in deciduous teeth, appears in many cases, either to cause an apical disturbance of the circulation, or else carries bacteria into the root canals, causing apical pericementitis, and the clinical histories of many such cases show alveolar abscess within a few months. After years of recorded experiments, I was forced to the conclusion, that most deciduous pulps could be removed more quickly and more easily through the application of 1/50 gr. of arsenic, than in any other way. Furthermore, contrary to the general belief, pulps may be devitalized *before* root development is complete or *after* resorption begins, provided the operation is properly safeguarded.

In the treatment of deciduous pulps, to obtain desired results, every step must be taken with the same degree of care and precision that would be given to a difficult piece of porcelain restoration. The treated tooth will often give good service for a longer term of years, than many carefully constructed porcelain jacket crowns.

**Pulp Capping Not  
Indicated in  
Deciduous Teeth.**

Devitalizing a deciduous pulp is one of the simplest and least painful of the operations undertaken for children, but, as the careless use of any preparation containing arsenic is inexcusable, every

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\*"Children—Their Management and Care of Their Teeth." *Journal of A. D. A.*, March, 1923.

safeguard must be employed. Many pulps must be removed because if there is an exposure the pulp is already infected, and any capping does not prevent but only postpones the inevitable abscess that follows infection of a tooth pulp. If many a dentist in general practice were to see every deciduous pulp he has capped, three months later, he would be greatly astonished to find how large a percentage of his operations had failed. The children's dentist sees most of these failures. If the large bulbous portion filling the pulp chamber is amputated the portion in the root canals can be sterilized and left. When resorption causes the shedding of the tooth it will be nearly as normal as that of a tooth with a live pulp. The simplicity and *lack of pain* with which the pulps may be removed, has led me to abandon, almost entirely, the capping of a deciduous pulp.

Some members of the profession have criticized my practice of dividing the operation of devitalizing a deciduous pulp into so many periods, but a child seldom needs to have a pulp devitalized, unless there are a number of other operations also necessary. In an earlier chapter, I have explained the importance of filling all cavities. One or more of these may be prepared and filled each time the child comes for a treatment. In this way no time is lost. Also, more time must often be taken with children, as this work cannot be pursued with the rapidity of that of adults.

**Technique for  
Devitalization.**

In cavities approaching pulps, where all the soft caries cannot be removed painlessly with a spoon excavator after one or more treatments of Fletcher's carbolized resin, it is better to devitalize, as in such cases pulps *are already infected*. Otherwise, the child may return in two or three months with abscesses.

In operating in an oral cavity where there are teeth with abscesses and teeth to be devitalized, protect the exposed pulps with phenol compound upon cotton, and fill with temporary cement for a few days until the treatment of the abscessed teeth has been carried so far that the mouth is free from pus.

To make the technique clearer, the complete operation of devitalizing and filling a tooth is divided into six or seven operations. If there are two or three teeth to devitalize, prepare and carry them all along at each sitting so that at the sixth or seventh appointment they will all be completed. In arranging appointments for a patient having only one devitalization, prepare and fill the other cavities, one or two at a time, so that when the last appointment is reached the mouth will be completely repaired. My method is as follows:



### Devitalization and Subsequent Filling of Deciduous Teeth.

#### First Operation.

A tooth with an exposed pulp should be gently washed and the cavity packed with cotton dipped in carbolized resin. Instruct the parents to prohibit sweets and hard foods, and to have the child return the next day for the devitalization of the pulp. If the cotton treatment has been lost, repeat it before applying the arsenic. The question is often asked, "Does not the child suffer pain for several hours after the arsenic wafer is applied?" If the hyperemia has been reduced and the treatment properly sealed in, he *does not suffer* any pain. If the pulp absorbs the drugs combined with the arsenic, it is anesthetized before the action of the arsenic is felt.\* We tell the child that if he will sit still for just a few minutes we will put in some medicine that will put the tooth to sleep so it will never ache again. One operator removed the pulp of a tooth and then began work on a vital one, whereupon the small boy exclaimed, "The other tooth was asleep but that tooth is awake."

#### Second Operation.

Seal in one devitalizing wafer\*\* with pink temporary cement and leave *twenty-four hours only*. If there is danger of leakage, paint the surrounding tissues with iodine *before* applying the arsenic. Do not use a rubber dam. Keep dry with a folded napkin. Allow the soft cement to run in and fill the cervical third of the cavity first. If there is an approximal cavity, let the cement flow into it for support. Leave in only twenty-four hours. The only exception to the twenty-four hour rule, is in a tooth with a large occlusal cavity where the four walls are intact. This frequently occurs in very young children where the cavity is very deep and sensitive and you are convinced that the pulp is already infected, so that filling the cavity without removal of the pulp would be followed by an alveolar abscess. In such a case the devitalizer may be left *forty eight hours* but never longer.

#### Third Operation.

Twenty-four hours later the next operation is performed.

With a drill, made from a cross-cut fissure bur, in the right angle hand-piece, cut into the cavity and remove the filling and devitalizing wafer. Wash the cavity and mouth freely. Examine the gums for signs of leakage of the arsenic. If there is any portion showing a whitened membrane, remove this membrane carefully and paint with iodine. Break down and smooth overhanging walls with a chisel. Remove all caries with a large round bur, or spoon excavator. Take a cross-cut fissure bur in the right angle handpiece and cut away the roof of the pulp chamber, exposing all

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\*See Chapter "Medicines Useful in Operations for Children."

\*\*The J. Bird Moyer Co.

root canals. Be careful not to injure the walls of the pulp chamber. This can be prevented by always drawing the bur toward the occlusal surface of the tooth. With a round bur remove all of the soft tissue, *amputating* the pulp at the root canals. *Do not use a broach*. Wash with cold water until the bleeding stops. Dry the cavity and seal in a dressing of phenol

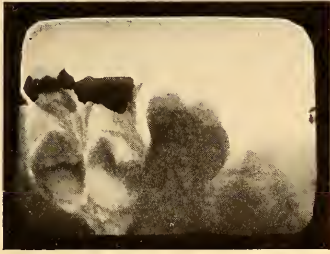


Fig. 61.

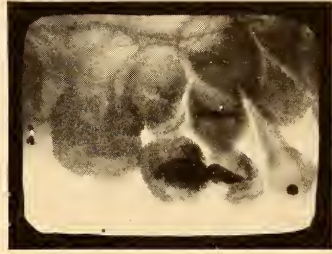


Fig. 62.

Fig. 61. Second deciduous molar devitalized. Radiograph seven months later.

Fig. 62. First deciduous molar devitalized at fifth year. Radiograph taken at sixth year.

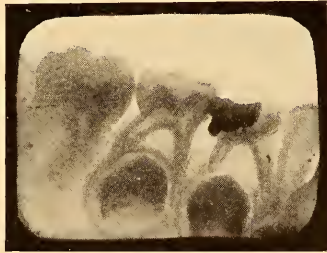


Fig. 63.

Fig. 63. Lower first deciduous molar, one year after being devitalized. Tooth and gums normal in appearance and child masticates hard food in comfort.

compound with pink temporary stopping. For this purpose I have found Gilbert's stopping easier of application and removal than any other.

**Fourth Operation.** Forty-eight hours later perform the next operation.

Clean the tooth with alcohol and remove the temporary stopping with the warm point of an instrument. Protect the tooth from saliva while taking out the pellet of cotton. Place a dressing of formocresol and seal with pink stopping. This coagulates the tissues in the root canals and not over one-half of one percent ever give further trouble. If all cavity preparation has not been completed, it must be done before sealing in the formocresol.

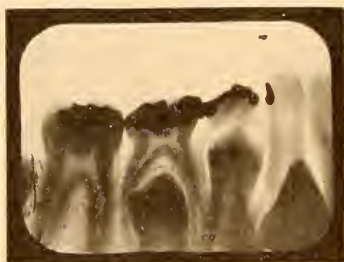


Fig. 64.

Fig. 64. Right lower first deciduous molar presented with an abscess in August, 1921. The upper right first, and the lower left first, and right second molars, devitalized at the same time. Radiographs made two years later.

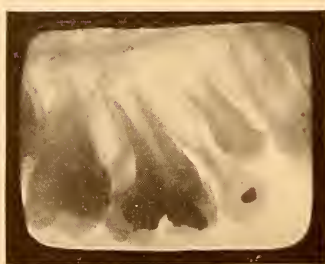


Fig. 65.

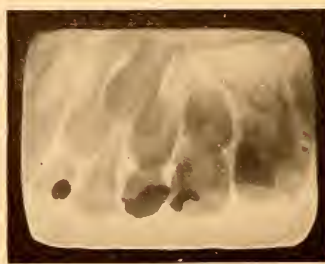


Fig. 66.

Fig. 65. Upper deciduous first and second molars, two and one-half years after being devitalized. Deciduous cuspid and second molar had no successors.

Fig. 66. First deciduous molar two and one-half years after being devitalized.

Be careful to let no saliva enter the cavity after this treatment, or the tissue in the root canals will become infected. Under no circumstances use a broach in a molar. In cuspids and central incisors with very large root

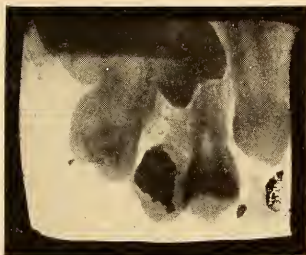


Fig. 67.

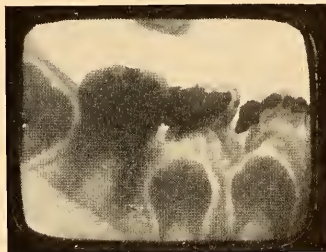


Fig. 68.

Fig. 67. Second deciduous molar three years after being devitalized.

Fig. 68. Second deciduous molar four years after being devitalized.



Fig. 69.



Fig. 70.

Fig. 69. Fused tooth, four years after devitalizing lateral root. Central incisor root presented an abscess when the patient was first seen. (Note: Permanent lateral incisor is normal in development.)

Fig. 70. Second deciduous molar devitalized February, 1919. Radiograph March, 1923. Four years. Copper amalgam in first molar placed 1919.

canals, it may occasionally be necessary to engage the large pulp with a Dayton broach and quickly withdraw it removing the contents of the root canal.

Sealing formocresol with stopping is contrary to the general practice; but after experimenting with cement I returned to this method for three reasons: First—mastication, causing pressure upon the temporary stopping, forces the formocresol into the root canals where it more thoroughly coag-



ulates the tissues left. Second—it is difficult to remove cement and get clean margins without admitting saliva to the cavity. Third—the pressure on the stopping pushes away the soft tissues and gives a clear view of the cervical margins. If the stopping is built too high, it may cause pressure and pain and leave bleeding gums, but experience soon corrects this mistake.

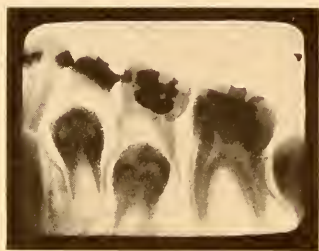


Fig. 71.

Fig. 71. First molar devitalized May, 1919. Radiographed May, 1923. Four years later.



Fig. 72.

Fig. 72. First molar devitalized January, 1919. Radiographed March, 1923, four years later.



Fig. 73. Devitalized July, 1916. Copper amalgam inserted when treated. Radiographed five years later.

#### Fifth Operation.

Twenty-four to seventy-two hours later we take the next step.

Clean the tooth with alcohol and remove the dressing. If the operator works slowly, place a napkin, or cotton rolls, to protect the tooth, before removing the treatment, as no saliva should be allowed to reach the cavity after the removal of the bulbous portion of the pulp. Drop hydrogen peroxid into the pulp chamber. If there is no effervescence, dry and pack the pulp chamber with alum paste, (if the pulp filament in the canal has been removed, gently force the paste into the root canal with a probe)



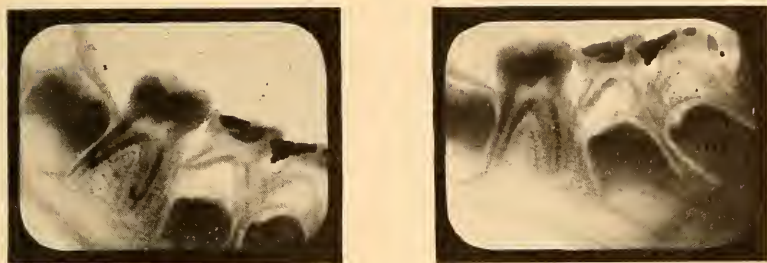


Fig. 74.

Fig. 74. Two views of the lower left second molar devitalized 1917 at the age of four years. Radiographed 1922. Five years later.

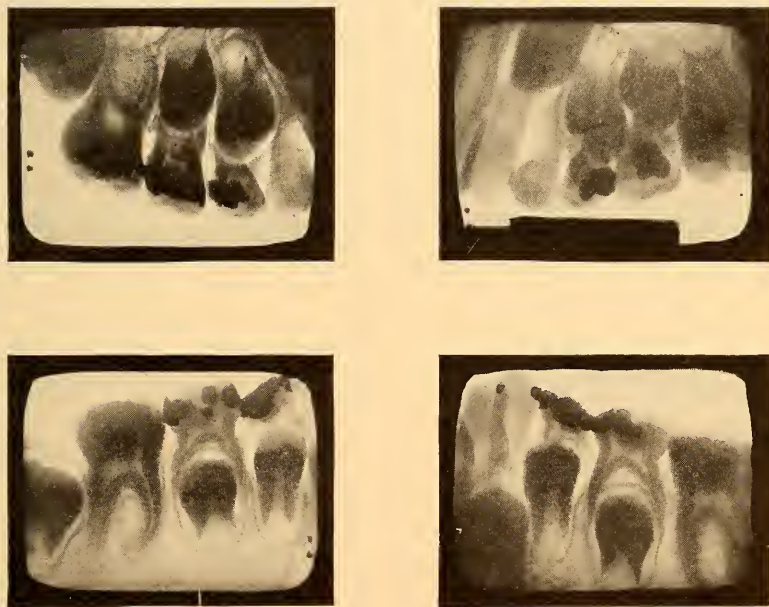


Fig. 75.

Fig. 75. All first deciduous molars devitalized April, 1918. Radiographs, 1923, five years later. Copper amalgam filling inserted when treated.

and seal with white stopping. If there is effervescence, repeat the formocresol treatment.

In exfoliated teeth, shed over a period of years, better resorption has been found to follow the use of the mild remedy, alum paste, than with any

other agent. It does not appear to act as an irritant to the osteoclasts when resorption begins.

The use of *pink* cement or stopping, over all incompleated treatments, and of *white* cement or stopping, over completed treatments, enables the operator at a glance to recognize where more treatment is indicated. This is very valuable, as it saves the operator's time in looking at the



Fig. 76.



Fig. 77.

Fig. 76. Pulp of first permanent molar amputated. Deciduous second molar devitalized February, 1916. Radiograph July, 1921. Copper amalgam filling untouched during the five and one-half years.

Fig. 77. Second deciduous molar devitalized 1916, seven years before radiograph was made. First molar devitalized 1919, four years before. Copper amalgam fillings as originally put in.

chart to find the next step in the operation, and is of special value if the child is being handled by different operators. It is very important that all cavity preparation should have been completed before using the alum paste.

**Sixth Operation.** Twenty-four to seventy-two hours later we proceed as follows:

Remove the outer portion of the stopping, being careful not to disturb the part in the pulp chamber. Wash away the pieces. Apply a napkin, dry the cavity and sterilize the remaining stopping and cavity walls with phenol. Press the stopping as far as possible into the pulp chamber to force the alum paste into the root canals. This compensates for the shrinkage of the soft tissues. Trim the stopping and leave as much as possible in the pulp chamber. In some cases the pulp chamber must be used for retention, so that little stopping can be left. Complete the operation by filling the cavity with copper amalgam. Instruct the parent to prevent the child from putting anything but liquids into the mouth that day, so as to give the amalgam time to crystallize. (Figs. 61 to 77.)

### Exceptions to Devitalization. Careful Diagnosis.

I. Before deciding upon the treatment of diseased pulps, during the first and second appointments, study the history and health of the child. If he is physically below normal, or if he has a history of tuberculosis or syphilis, the prognosis is unfavorable and it is unwise to undertake *any pulp treatment*. Carefulness at this time in the decision of what operative procedures should be undertaken, will save much disappointment to both the operator and parents at a future date. To the operator, because of weeks of wasted time for which it might be unwise to charge an adequate fee; to the parent, because of the time spent in numerous visits to the office only to have the tooth extracted. He may remember that at the first visit he had wanted it "pulled out."

II. When a pulp exposure is unavoidably made, in cutting retention in a deciduous central or lateral incisor, it is sometimes advisable not to devitalize. If the child is in normal health and the exposure has been made with a clean bur, in a clean cavity, protect the cavity from saliva with a napkin or cotton rolls as soon as the exposure is discovered. Wipe the cavity with phenol, dry with air, and fill immediately with cement. Some of the pulp cappings offered may be used with success, but teeth treated in this manner must be kept under observation, as at any time the infection may overcome the deterring agent and an apical abscess may result.

III. After the ninth year, when an exposed pulp presents in a *first* deciduous molar, generally shed during the tenth year, wash its cavity and pack with carbolized resin for twenty-four hours. Upon examination the next day, if there is no pus and the pulp is vital, bleeds freely, give a nitrate of silver treatment (Howe) and fill with *copper cement*. Build with a wide contact point against the approximating tooth to maintain the mesio-distal diameter and also to protect the gum tissue of the space from the pressure of food fibres packing against it. This enables the child again to masticate with ease. Between the age of *eleven and twelve* the *second* deciduous molars should be treated in the same way. The resorption of the roots may be nearly complete, but this operation will permit the tooth to remain until the bicuspid is ready to replace it. Under no conditions, leave *cotton* in a tooth under any filling except during treatment. Cotton invites hematogenous infection and forms an excellent harbor for incubation.

IV. Traumatism. In examining the teeth of a baby between one and two years with broken incisors resulting from a

fall, many conditions arise which must be considered. If the patient is seen at once, the operator may have little fear of bacterial invasion, and some hope of saving the pulp in the root canal so that the development of the root will be continued. This is most desirable, as the space in the jaw should be held by these roots until the permanent teeth are sufficiently developed to take their place.

If the tooth is broken off, leaving a protruding pulp, it is often more humane to hold the child and extirpate the pulp at once. In such a case, seat the mother in the dental chair if she wishes to help, and is not of the hysterical type, or banish her and let the nurse take her place. Let the assistant (mother or nurse) hold the child in her lap firmly, holding its body and hands. Sometimes she may have to hold its feet between her knees, or if the child is very strong, they may be held by an assistant. Protect the tooth with a napkin and wipe the pulp very gently with cotton dipped in phenol. With a new, round bur, which has been dipped in phenol, amputate the pulp far enough below the broken edge of the tooth to put in a plug of cement. Stop the bleeding with formocresol, being careful not to get it upon the surrounding gum tissue. Cut a small groove around the canal, with a small inverted cone bur, where the pulp is amputated so that your filling will hold. Dry the tooth and press in cement of a hard mix. Paint the surrounding tissues with iodine. Such a tooth must be kept under observation, and may later have the outer part of the cement replaced with copper amalgam. If the patient is first seen two or three days after the accident, and the protruding pulp is swollen and dark colored, proceed in the same manner as above, except that instead of amputating the pulp with a bur, you insinuate a Dayton broach that has been dipped in phenol, as far up the side of the canal as possible, and after turning it until the pulp is engaged, sharply withdraw it. Hold the head over the cuspidor and wash the tooth with water until the bleeding ceases. Dress with modified phenol and continue as in the treatment of a devitalized tooth.



## CHAPTER IX.

### Treatment of Abscessed Deciduous Teeth.

Infection of pulps and abscesses in deciduous teeth may be caused in two ways: through bacterial invasion of the pulp, following caries, or from death resulting from a blow or fall. In the first condition, after bacteria have entered the dentin through a break in the enamel, there is a rapid growth of the bacteria, which find an easy entrance into the pulp through the large tubules.

The pulp (Fig. 78) in a deciduous tooth is larger, in proportion to the tooth, than in a fully developed permanent tooth. When the bacteria invade the pulp, an irritation is set up, causing its death. Unless the tooth is treated immediately, the invasion of the bacteria will continue down the root canal to the apex of the root; then they will spread into the surrounding tissues and cause an apical abscess. As an alveolar abscess develops pus burrows in the direction of least resistance, generally through the spongy bone of the alveolar process, opening finally into the oral cavity, usually on the labial or buccal surface. The opening of this sinus is the fistula—generally termed a “gum boil.” In rare instances pus will travel from the apex of the root to the cervical margin, destroying the periodontal fibres in its path.

In the death of a pulp from trauma, the blow causes an inflammation at the apical end of the tooth which cuts off the circulation of the pulp. (Fig. 79.) The bacterial invasion of such a pulp is from the blood stream. If the tooth is not treated an abscess with a fistula opening on the gum follows, in the same manner as from the carious death of the pulp. A dead pulp in a deciduous tooth requires careful treatment if the tooth is to maintain its usefulness until exfoliated.

Dead pulps may be classed under three headings but because the different stages occur with such rapidity, there is not so clear a dividing line between them as with similar sequellæ in permanent teeth.



### Pulp Exposure Due to Caries.

**Class I.** Class I includes teeth where the pulp has just died but has not become septic. In making a diagnosis of pulp exposure due to caries, the pulp may appear vital and be marked on the chart "to be devitalized." In preparation for that operation,

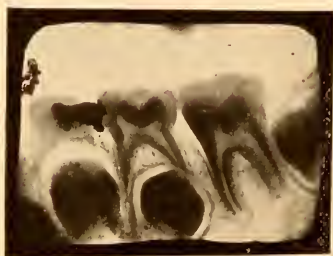


Fig. 78.



Fig. 79.

Fig. 78. The pulp in a deciduous tooth is larger in proportion than in a permanent one. In this case the deciduous first molar had been devitalized three years previously, but illness had lowered the child's resistance and an abscess had formed. As the child was still in poor health, the tooth was extracted.

Fig. 79. Traumatism caused death of pulp in right central and lateral incisors. Method of opening central for treatment. Shows absorption.

the cavity should be packed with carbolized resin on cotton, and at the next appointment it may be found dead, having died without pain. It must not be supposed that the pulp has died from the action of the phenol; it dies as a result of bacterial invasion and infection. No doubt many who use "repeated treatments" of phenol or other similar agents, unknowingly experience this phenomenon, and think, mistakenly, that they are devitalizing the pulp. In Class I cases, which also includes death of the pulp by traumatism, where the patient is seen soon after the accident, there is always the hope of averting an alveolar abscess by the early treatment of the pulp, so that growth of the bacteria in the root canals may be inhibited. When the treatment is completed, such a tooth may last, in much the same way as a tooth wherein the pulp was intentionally devitalized and its resorption may more nearly resemble that of a vital tooth than the resorption of the roots in Class II or III.

In Class I, the pulp chamber should be opened the same as after pulp devitalization, the bulbous portion of the pulp amputated and the rest

of the treatment followed, as outlined in the previous chapter. As extra care should be taken to insure asepsis, it is well to give these cases two treatments of formocresol, drying the tooth with air so that penetration by the formocresol of the pulp tissue left in the canals will be insured.

**Class II.** Class II includes all teeth with septic pulps, but where there is no fistula, although an alveolar abscess may be forming. With careful treatment, there is the probability that such a tooth, when treated, will remain in good health for a number of years. In examining to determine the class to which the tooth belongs, special attention must be paid to the physical condition of the child. Is his general health good? Has he had many children's diseases? Was he bottle fed? Does he show signs of anemia or rhachitis? What is his age? Often some history of the health of the parent may shed a light upon the situation. If the child is undernourished and the tooth is within a year or two of being exfoliated, it may be wise to extract it. Do not judge entirely from the condition of the child upon his first visit, because he may have been without sleep or proper food for several days and nights.

Open the pulp chamber as painlessly as possible. In most cases this is very easy as it is only necessary to clean out the cavity and give the pus free drainage. Occasionally a case will be presented where the tooth is very sore, because the pus has found no outlet. Open into the pulp chamber with a sharp number 33½ inverted cone bur with the least possible pressure. As soon as the pulp is reached, wash thoroughly and then have the child suck on the tooth to start the flow of pus and blood. This will bring immediate relief. Sometimes the opening can be enlarged at this time with a small fissure bur, followed by a larger one. If there is much soreness, it is best to leave open twenty-four hours before enlarging the opening. If the cavity is large, pack it loosely with cotton. Instruct the parents to give the child a cathartic and to keep him upon liquid food until his return. But if he has suffered pain during the previous night, have him taken home immediately; give him a warm bath and a glass of warm milk after the cathartic, and put him to bed in a cool, darkened room. The result of this treatment is almost magical, and I have sometimes failed at the second appointment to recognize in the now calm, brave, confident little fellow, the nervous, hysterical child of the first visit.

At the second appointment, if the soreness is gone, break down overhanging walls with a chisel and cut away the roof of the pulp chamber in the same manner as in removing a pulp. Wash the cavity, removing all debris; dry the tooth and seal in formocresol with pink stopping. At the next treatment, protect the tooth from saliva and test with a drop of hydrogen peroxid, using a curved explorer. If the contents of the canals have

not liquified so as to be easily washed out, the canals should be cleaned with a small Dayton barbed broach. Great care should be taken not to force any of the septic material through the apical foramen. Many teeth must be treated after resorption of the roots has begun, and such roots will be found shorter, with larger openings than before resorption begins. For this reason use the broach only at the time when the canals are being cleaned, and afterwards always use a curved explorer during treatment. A tooth with the roots partly resorbed may be lost through the careless use of a broach. At each appointment renew the formocresol until all effervescence ceases when the peroxid is used; then fill with alum paste, being careful to carry the paste well down in the larger canals. This must be done with judgment as too much pressure may cause pain.

**Class III.** The third class includes abscessed teeth having fistulæ opening upon the gums. In diagnosing

a case, be thorough in your search for this. Many an abscess will have a lingual opening instead of the usual labial or buccal one. In many cases the fistula will have closed temporarily, but pressure over the tooth will often disclose its location by the appearance of a drop of pus. The prognosis of a tooth with a fistula is uncertain. If the floor of the pulp chamber has softened, do not make an attempt to treat the tooth. Where the crown of the tooth is broken away and where the walls of the pulp chamber are hard and firm, the tooth often may be saved.

**Hypertrophy of  
the Pulp.**

Occasionally an abscessed tooth will present with a hypertrophied pulp entirely filling the cavity. This tissue should be treated with a drop of trichloroacetic acid and cut away. The hemorrhage is generally profuse, and it may be necessary to use another drop of the acid as a hemostatic. The prognosis in these cases is not always favorable, but many such teeth have been restored to usefulness.

**Hypertrophy of  
Septal Gum Tissue.**

More frequently hypertrophied *gum* tissue will fill the cavity of the abscessed tooth. As a rule, painting with iodine, and packing cotton and carbolyzed resin in the pulp chamber will remove the obstruction. Occasionally the hypertrophied gum must be painted with phenol and removed with a lancet or curved scissors.

**Treatment of  
Class III Abscesses.**

In treating Class III abscesses, clean the cavity and treat with formocresol, as in Class II, leaving the fistula alone. My earlier experiences have led me to conclude that it is unwise to try to force any treatment through the tooth and out through the fistula. Any remedy that effervesces, like hydrogen peroxid is especially painful and dangerous, as it forces the septic matter into

the surrounding healthy tissues. If the fistula has not healed at the third treatment of the tooth, it should be given care, or, if the pus has not broken through the soft tissues, it may be necessary to incise. The location, size and color of the swelling must be considered. If it has reached a point where the pus is about to break through it will be soft and yellowish in color. In such a case, touch the yellow spot with phenol and at once incise with a small sharp lancet, not making a long cut. Press upon the sides of the swelling until the blood and pus have all been pressed out; then wrap a wisp of cotton around a smooth broach, dip into iodine and introduce into the fistula, disengaging the cotton and leaving it in the fistula to act as a drain. If the cotton extends beyond the opening of the fistula, tuck in the ends, or clip off with a pair of curved scissors. Give the patient an appointment for the next day, when the appearance of the fistula will determine the treatment. If the swelling has subsided and there is some bleeding on pressure, replace the drain with one dipped in campho-phenique to keep the fistula open and clean. If there is a flow of pus on pressure, carry a slightly longer drain of cotton dipped in phenol-sulphonic acid, well into the alveolar abscess. The acid cauterizes and stimulates healthy growth. It may be necessary to keep the fistula open with a drain dipped in campho-phenique for two or three subsequent treatments, but if the fistula does not heal, the tooth should be extracted.

**External Fistulæ.** Where there is considerable swelling of the face, have the patient kept in bed between appointments and fed a light nutritious diet. Be very careful to instruct the parent *not to poultice the face*. If this has already been done before you see the patient, and the abscess is about to break, or already has made its appearance upon the face, treat the tooth in the usual manner and send the child *at once* to a reliable surgeon whom you have consulted and whose work you know. If handled in the proper way, a fistula, opening upon the cheek or neck can be healed without leaving a scar, but this requires the services of a skilled surgeon.

**Infection of Glands.** In many cases, instead of forming a fistula on the gum, the pus from an abscessed molar in the lower jaw will follow the course of a lymphatic channel and penetrate the lymphatic gland of the neck, or the pus may burrow to the salivary glands. In many such cases, medical attention and extraction of the tooth will be necessary.\*

If there is any question in the mind of either the parent or the operator as to whether an effort should be made to save a tooth that does not

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\*See Figs. 15, 16, 17.



respond readily to treatment, a radiograph should be made to determine the position of the permanent tooth. If the crown of this tooth is not fully developed, early extraction of its deciduous predecessor removes all obstructions and will allow it to erupt prematurely without developed roots. Such permanent teeth are rarely long-lived and the enamel is often soft and discolored.

Occasionally, a treated deciduous tooth will show a fistula when its successor is about to erupt. This does not prove that further treatment is



Fig. 80. The enamel of the permanent tooth can often be felt with a probe inserted into the fistula.

necessary, but it does indicate the need for immediate extraction. In such cases, with a probe inserted into the fistula, the hard enamel of the erupting tooth can be felt. (Fig. 80.)

#### **Gum Boils.**

"A gum boil," as the laity call a fistulous alveolar abscess, is a serious menace to the health of the child, and this danger should be explained to the parent. He must be made to realize that not only is the pus swallowed with the food, poisoning the alimentary canal, but that the blood vessels around the abscess in the jaw are carrying poisons into the circulation that will greatly reduce the resistance of the child to disease. A child with two or three chronic abscesses, will nearly always be found anemic, undersized, and suffering from indigestion and malnutrition. He is often the victim of frequent colds.

The apathy of the average parent with regard to the "gum boils" of her child, is not to be compared to the stupidity of the physician or dentist, who views such a condition with indifference and gives the advice to the parent to leave in such roots to hold the space for the developing permanent teeth, but does nothing to render them aseptic. If the health of the child is to be considered, *all abscessed teeth must be treated successfully or extracted.* Besides lowering the health of the luckless child, and increasing the danger of malocclusion because of the erupting tooth following the track of the abscess, or because of the impaction of the permanent



tooth, there is always danger of injury to the enamel of the succedaneous tooth if the child is young. Dr. Guthrie discusses this on Page 281, *Journal A. D. A.*, April, 1923.

**Maldeveloped  
Bicuspid.**

When I was an undergraduate working in an office during vacations, my preceptor asked, "Why are bicuspid so often lost early in life?" Of course I did not know, but the following history will shed some light on one of the causes. In 1919 Paul B., seven and one-half years of age, was brought

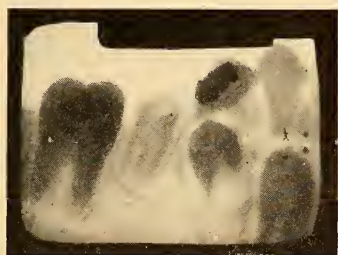


Fig. 81.

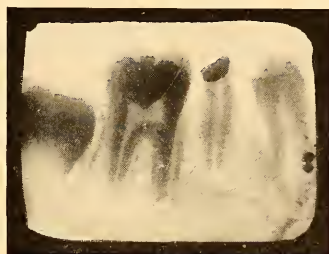


Fig. 82.

Fig. 81. Paul B., seven and one-half years of age in 1919. History: lower left second deciduous molar so badly abscessed that extraction was necessary. The first molar had abscess treated and copper amalgam filling inserted April 2, 1919. Radiograph October, 1921.

Fig. 82. Bicuspid erupted malformed and lacking enamel; probably due to action of pus. Radiograph April, 1923.

to the office with a chronic abscess of the lower left second deciduous molar, with several fistulous openings on the gum, and the walls of the pulp chamber so soft that a sharp instrument would puncture them. Paul could not remember when the tooth had not given trouble. The tooth was at once extracted. Two and one-half years later, there appeared upon the surface of the gum what looked like part of a root. This prompted the taking of a radiograph (Fig. 81) for diagnosis. The tooth was watched and filled as it emerged from the gum, but it was so imperfectly formed that when the second radiograph (Fig. 82) showing an apical abscess, was taken in 1923, it was extracted.

Another reason why bicuspid are so often missing will be found in the chapter on "Extraction of Deciduous Teeth."

**Canker Sores.**

Before leaving the question of "gum boils," there is one thing more to be said. Many parents confuse gum boils with canker sores which are inflamed, painful spots, dark red in color, usually found on the labial or buccal surface of the

mucous membrane. Cankers<sup>o</sup> may be due to a deranged digestion. A child is often brought in by the parent thinking that a tooth has abscessed, and the situation should be clearly explained to her. When a canker sore is found, it should be painted with iodine. The parent is instructed to have the child, before retiring, rinse the mouth with milk of magnesia and pay strict attention to diet.

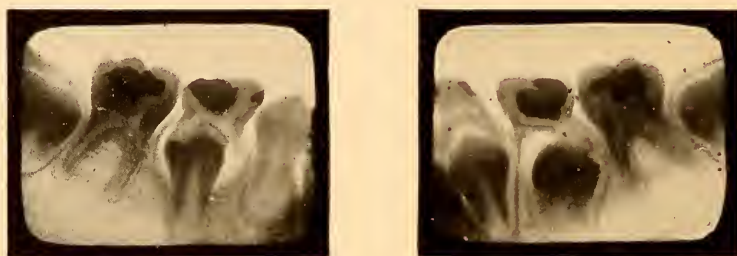


Fig. 83. Illness caused an abscess to form around the roots of the second deciduous molars, five years after devitalization. Extraction was necessary.

#### **Pulp Death from Traumatism.**

Frequently, one or both of the upper central incisors may be found with pulps that have died, as the result of an injury, due to falling on the face, or a direct blow. If the child is in good health and is coming for monthly oral prophylaxis, such a tooth may be watched from month to month. In the majority of cases, however, especially if it turns black suddenly, or if there is any indication of inflammation over the labial surface of the root, it is best to open, drain and treat the tooth. There is seldom any pain in this operation. Open on the lingual surface of the tooth, beginning with a number 33½ bur, and follow with fissure burs, as in opening any abscessed tooth. After washing out the *blackened fluid*, it may be necessary to use a Dayton broach, but care should be taken not to introduce the point farther than the first third of the root. Treat with formocresol in the manner previously described.

Follow-up work is necessary after treatments. Any illness may be followed by inflammation around the roots of a treated tooth. (Fig. 83.) This was very noticeable during the epidemic of influenza of 1918-1919. If treatment of these conditions is undertaken at the earliest moment, which usually would be at the next appointment for prophylaxis, this area may be rendered healthy and the function of the teeth restored to normal. The parent is instructed to watch treated teeth, and at the first indication of trouble, to bring the child to the office. In such a case a radiograph

should be made to help decide whether to extract the tooth, or to make another effort to save it.

It seems impossible to devitalize or treat a *deciduous* tooth without its becoming discolored. The staining of the dentin in the tiny teeth, is one of the disagreeable features of the work, but psychologically it often has a good effect. Where the child is ashamed of the dark tooth, an opening is given for the operator to suggest that care will prevent any such disaster to the permanent teeth.

**Root Resorption.** Resorption of the roots of a deciduous tooth, treated because of alveolar abscess, may not occur when its time to be shed arrives. Treated teeth should be watched and radiographed and extracted at the proper time so that the development of good occlusion will not be hindered.

## CHAPTER X.

### Extraction of Deciduous Teeth.

In planning the repair of a pathological oral cavity, during the second appointment, try to determine which teeth should be retained and which should be extracted. Here the age of the child plays an important part. It is never wise to try to treat and retain a deciduous molar if it must be lost (Fig. 84) within a few months, particularly if any of the others of the same group have been shed, or if one of the succeeding bicuspid has erupted. Neither is it wise to extract a tooth that may be saved through careful work, even though it extends over several weeks, if the tooth is needed to maintain the mesio-distal diameter (Fig. 85) of the arch for a number of years. To be successful, it may be necessary to gain the coöperation of the parents, in a home program of a simple, nourishing diet, more sleep and exercise in the fresh air and sunshine in order to build the necessary resistance to disease, but in such a case, the blame for your possible failure will be shared by the parents, if carelessness at home is continued.

If the child is in normal health, a tooth with a pulp chamber that has a solid floor, may, in a large majority of cases, be restored to health.

It may not always be possible to arrive at a decision, until after two or three treatments; but before undertaking treatments in doubtful cases, explain to the parent the possibility of loss of space in the arch, with the probable later need of orthodontic treatment, and he will readily agree to the time spent, even if eventually the tooth must be extracted.

The lay mind is more impressed with the value of each individual deciduous tooth, when he watches the time and care used in restoring to usefulness what appears to him (and unfortunately to many of the dental profession) a worthless wreck. Radiographs and plaster models are of value in illustrating to the parents the evils of early extraction. (See Figs. 86 and 87.)

Examine the gums above the diseased tooth, and see if the bicuspid is developing. If in doubt, have a radiograph of that area made. If there



is a fistula leading from the abscess, examine carefully through it with an explorer, and the hard surface of the enamel of the advancing bicuspid may often be felt.

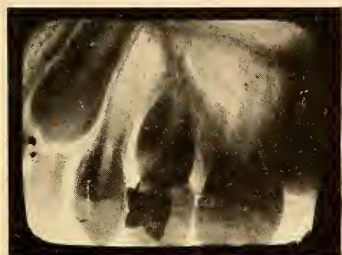


Fig. 84.



Fig. 85.

Fig. 84. It is never wise to treat and retain a deciduous molar if it is to be lost within a few months.

Fig. 85. An unsuccessful effort was made to retain the second deciduous molar for this four and one-half year old child as its extraction would cause loss of space. The child presented twenty-six cavities besides the abscessed tooth, and had little resistance to disease.

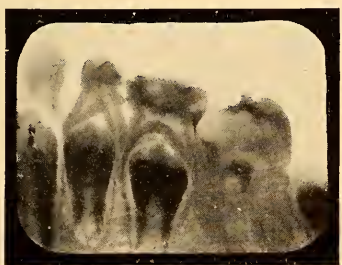


Fig. 86.



Fig. 87.

Fig. 86. Normal development.

Fig. 87. Loss of space due to early extraction.

It is unwise, in the majority of cases, to extract at the *first* or *second* appointments. It leaves a painful memory in the mind of the child that may be hard to eradicate. Except with highly nervous, or subnormal children, it is best to extract without an anesthetic. The work can be done so quickly that the mind of the child does not have time to conjure up a lot of fears. The use of a local anesthetic is often unsatisfactory, if the tissues are hyperemic, and the time taken in injecting it allows the imagination of the child free play.



If the child is subnormal or very nervous it may be necessary to give gas but with normal children this is rarely necessary. Most children fear a general anesthetic more than the slight pain attending the extraction of a deciduous tooth with roots more or less resorbed.

Always remember this rule for extraction: "Never extract a tooth to make room *except* for its immediate successor." This applies particularly to the incisors in a crowded arch because, if the lateral incisor is extracted

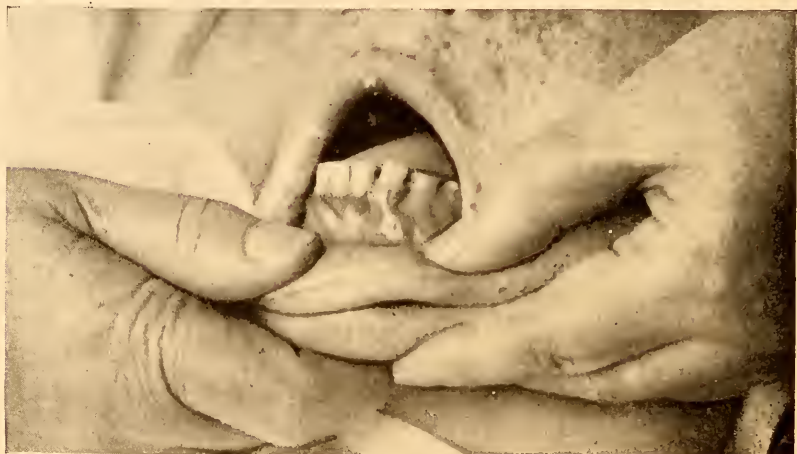


Fig. 88. Loss of space due to resorption of cuspid from pressure of erupting lateral, leaving no space for the permanent cuspid.

(Fig. 88) to give room for the central incisor, there is no development of the interproximal spaces. When the permanent lateral incisor erupts, it causes the resorption of the temporary cuspid, years before its time for exfoliation.

**Rapid Extraction.** When I am ready to extract, I tell the nurse to bring some Lavoris and warm water. I select the instruments necessary, talking to the child on other matters while I arrange them conveniently, but out of sight, putting the forceps into the pocket of my operating gown, as the mere sight of them often frightens the child. Then I say, "We are going to get rid of this nasty tooth." The nurse places her hands over those of the child and holds them gently and firmly upon the arms of the chair, while I quickly extract the tooth, almost before the mind of the child grasps what I am doing. As soon as the tooth is out, and before the child has time to cry, I hold his head over the bowl while the nurse gives him a mouthful of the warm solution to hold in his

mouth. The action is so rapid that the warmth soothes the pain almost before the child is conscious of it. If he is not badly frightened and *consents* to have the other extractions necessary, I do them at once. Unless he consents, I defer the remaining extractions until a future appointment.

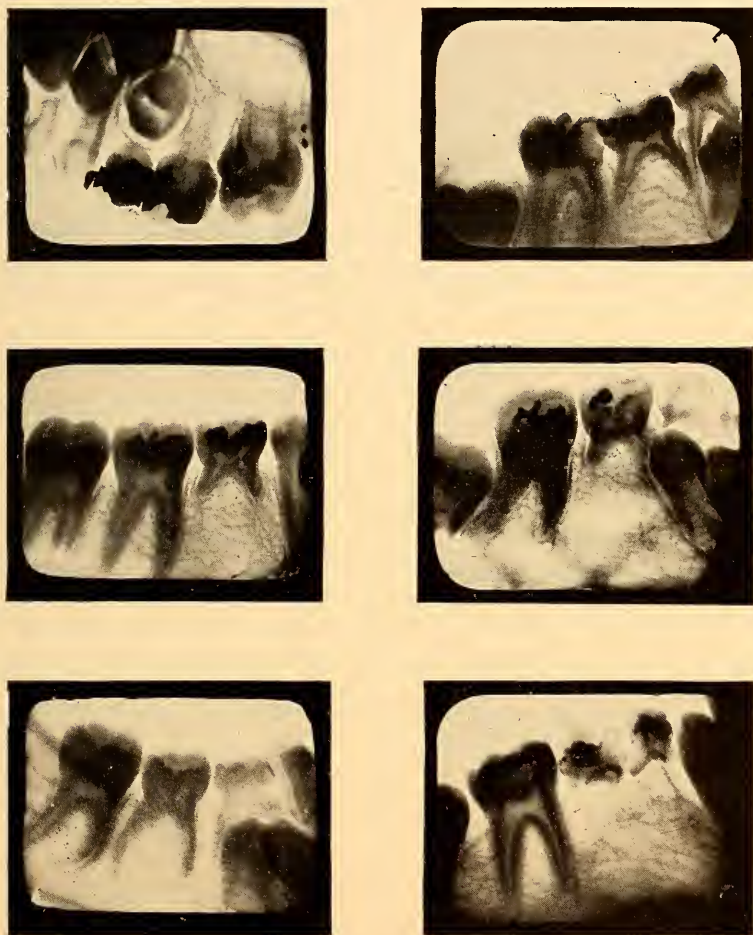


Fig. 89. Six radiographs showing deciduous molars with no successors.

Occasionally at the next appointment, after such a postponement, a child will be very refractory because he fears from every move you make, that you are going to extract another tooth. Many children have not the home training that enables them to believe that you are telling the truth.

In such a case, the only thing you can do is to extract and have the operation finished. In such case a local anesthetic may be helpful, especially in extracting deep roots.

Always remove *first* the tooth that you think will come out with the least pain. Most children are wonderfully good about extraction, and I fre-

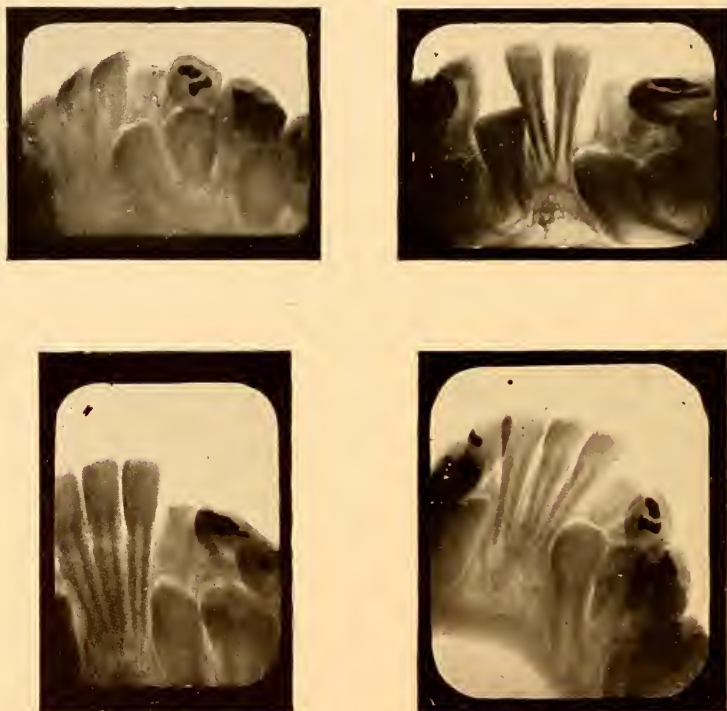


Fig. 90. Four radiographs, covering a period of 18 months, of a permanent incisor broken in an attempt to extract through mistaking it for a deciduous incisor. Pulp still alive.

quently have removed four or five teeth at one appointment when they find the first extraction so much easier than they had expected. Whenever possible with the anterior teeth, where resorption is nearly complete, extract without instruments, using your fingers only. Test the incisor and if the resorption of all margins seems normal, with the thumb give it a quick snap at a right angle to its normal axis, and the tooth is out without the child's knowing it. His surprise and delight are pleasing to the operator.

In a lower arch where the interproximal spaces have not developed, the

permanent tooth will erupt to the lingual of the deciduous incisor, without causing the resorption of more than the tip of its root, or a groove in the lingual surface of its root. No. 29 S. S. White forceps are valuable in grasping the crown of the deciduous incisor, without injuring the gums or the permanent tooth.

**Effect of the Sight of Blood.** Some children fear the sight of blood. A ruby inner bowl in the Clark cuspidor and the pink color of the antiseptic used in the warm water somewhat disguise this. I consider it nonsense to encourage hysteria at the sight of

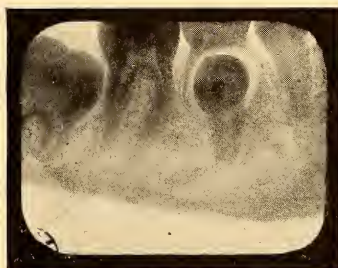


Fig. 91. Position of bicuspid between the roots of the deciduous molar. Precaution in extraction necessary.

blood, and believe such hysteria is suggestion from a neurotic mother. It is a phase that happily is going out with the Victorian "fainting females." The majority of children are not in the least afraid of blood. I have known many mothers to faint in the waiting room, while their children were bearing up with extreme courage and fortitude during extraction. The suggestion of such minds as the mothers' in the operating room, would make it impossible to do the work speedily and painlessly. I know that such mothers suffer more in anticipation, than do the children in realization. Fortunately, today parents are being more careful in describing their harrowing sufferings in the dental chair, within the hearing of their children who are about to visit a dentist. Most children do not feel much pain from extraction. One boy who had made an awful fuss before the tooth was extracted, said, "Golly! that didn't hurt. Give me the tooth so I can show the fellows." Another boy, of unusual type said, "That was a new experience but not a painful one."

**Molars with Spreading Roots.** Generally the extraction of deciduous teeth is very simple, but in rare cases it is more complicated. The spreading roots of the second deciduous molar, may be locked in by the first bicuspid and the first permanent molar, which



may necessitate splitting the crown and removing the roots separately, and this can be done without an anesthetic. If the child is very nervous, use a local anesthetic. With a small, cross-cut fissure bur, split the tooth buccolingually, and the pieces can then be removed.

After extraction, instruct the parent, upon reaching home, to have the child hold hot water, with an astringent in it, in his mouth. This should be done for five minutes at a time once an hour the first day, and several times a day afterward until the wound heals.

**Removing Incisor  
Roots.**

In extracting the carious root of an incisor in the upper arch, the easiest way is to cut a slit in the gum over the length of the root and lift out the root—usually there is almost no bony process covering it. If there is a hard bony process, No. 23 Germany root forceps will be useful in removing the root.

**Examine for  
Successor Before  
Extracting.**

A second rule for the extraction of deciduous teeth is, "Be sure, before extraction, that the tooth has a successor." (Fig. 89.) If a sound deciduous tooth does not become loose as time for its exfoliation approaches, do not extract without studying a radiograph of the underlying tissues. Many radiographs show no succedaneous incisors and many deciduous second molars have no permanent teeth to succeed them. When this condition is found, every effort should be made to retain the deciduous tooth. I once worked for a woman, during her fourth pregnancy, who had never been in a dental chair before. Her teeth were perfect with two exceptions. One of her third molars had a cavity, and her lower central incisors were apparently her deciduous teeth. Later her oldest son was a patient of mine, and when his lower central incisors were not shed, a radiograph showed that they had no successors.

**Be Sure Tooth is  
Deciduous Before  
Extracting.**

A third rule for the extraction of deciduous teeth is, "Be sure the tooth is deciduous (Fig. 90) before you extract it as such."

In extracting the deciduous lower molars, great care should be taken not to dislodge the bicuspid that lies between the roots (Fig. 91) of the molar. The molar should be tightly grasped with a pair of No. 60 forceps and gently rocked buccally and lingually to dislodge it, without injuring the bicuspid beneath, which at an early age has little or no attachment because of its undeveloped root. The roots of deciduous molars, if not extracted, may seriously injure the enamel of the permanent teeth against which they rest.



## CHAPTER XI.

### The First (Permanent) Molar.

The first permanent molar is the most valuable pearl in the world and should be guarded and protected as famous pearls are guarded. Other famous pearls *lie idle* but the molars *work* to build a healthy race.

Erupting during the sixth year, the first molar may be considered the most valuable tooth in the permanent set, because, from the sixth to the twelfth year it is the chief instrument of mastication, and if neglected during this period it may be lost.

In a previous chapter I have outlined the principle reasons for filling children's teeth. These reasons apply with greater force to the first molar because it is the foundation around which other teeth assume their position in the arch.

The chief reasons for filling deciduous teeth are: 1. To prevent pain. 2. To preserve a comfortable masticating surface. 3. To prevent toxic conditions. 4. To prevent malocclusion. 5. To preserve the first permanent molar.

As may clearly be seen, all these reasons apply also to the first permanent molar.

Too little attention is paid to the sufferings of childhood, and one of the reasons why so large a percentage of adults fall below the perfect standard, may be traced to the suffering caused by carious first molars with diseased pulps.

The pain, the septic poisoning and the under nutrition, due to illness and the loss of appetite, further undermine the resistance to disease. If these teeth are lost, the metabolic changes may have a life-long sequence.

The early loss of one or more of these teeth so unbalances the dental apparatus that the entire body suffers.

As soon as a cavity in a first molar becomes sensitive to thermal and chemical changes, the child ceases to masticate with that tooth. Such a condition is seldom found in a single tooth, but in most cases is found in some of the teeth in both sides of each arch. When to a large degree mas-

tication is stopped, malnutrition may follow caused by unmasticated, undigested or inadequate food, nervous reaction from pain, loss of sleep, or disease acquired through a lowered resistance due to the foregoing causes.

Many forget, or possibly do not know, that the development of the first molar requires nearly eleven years, including the later months of intra-uterine life of the child, and during these years many enemies endanger its existence. If it is lost in childhood serious malocclusion results.

The enemies to the perfect development and health of the first molar may begin their destructive work during the period of fetal life. Proper care of her health and diet, by the pregnant mother, is one of the most valuable aids in developing healthy first molars in her offspring.

In most dentures the first molars are the largest and strongest of the grinding teeth and are in the position where the greatest muscular stress is exerted upon the bolus of food. Occasionally, where the health of the child has gained after birth from a weak mother, the *second* molars will be found to be the largest and strongest teeth; but such cases are rare.

**Hypoplastic Teeth.** While a deficient diet of the pregnant mother may result in imperfectly formed teeth, with enamel less resistant to caries, a serious illness during pregnancy may cause hypoplasia of some of the teeth. The deciduous teeth are most effected by the illness, but, in many mouths, not only the deciduous molars, but also the first permanent molars are hypoplastic. However, hypoplasia, which is found more often in the first molar than in any other tooth of either set, is *more frequently* the result of *post-natal disease* of the child than a disease of the mother during gestation. It may be due to illness, or to faulty bottle-feeding.

After their eruption, hypoplastic first molars are a serious menace to perfect dental health. First, their vertical development is diminished and the bite is not opened sufficiently to allow the proper eruption of the developing teeth into good occlusion. Also, the inclined planes are destroyed, interfering with correct functioning of the molars. Hypoplasia of the first molar interferes with mastication, because these teeth are very sensitive to chemical and thermal stimuli, and soon become irritable to pressure. When this condition exists the child instinctively stops mastication; the teeth became coated with decaying food and gelatine plaques, and, being sensitive to touch, their hygiene is neglected until, without dental care, their loss, before the eruption of the second molar, is almost certain.

**Bottle Feeding a  
Menace to Tooth  
Development.**

A second menace to the perfect development of the first molar is bottle feeding of infants. Too often the diet is high in carbohydrates, resulting in teeth which, though perfect in form, have enamel

less resistant to caries than the breast-fed infant, where the mother is upon a well balanced diet. The bottle fed child continues its preference for a sweet, starchy diet, and the first molar erupts into an oral cavity where nature cannot overcome the existing pathological conditions.

The acids resulting from the excess of carbohydrates, attack every pit and groove, and, where there is no interference, the tooth is soon destroyed.

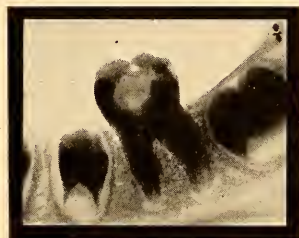


Fig. 92. An undeveloped first molar with a pulp exposure.

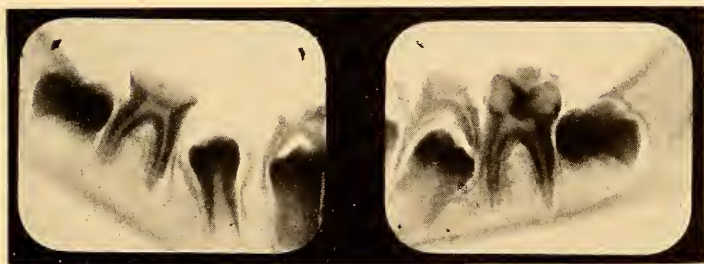


Fig. 93. First molars with pulps dead before the roots are completely formed.

#### Dangers to First Molars.

Probably one of the most frequent causes of the early loss of the first molar, is mistaking it for a deciduous tooth. It is surprising how many, even in this age of dental enlightenment, still consider the first molar a deciduous tooth. Not long ago a physician, who was on the staff of school inspectors, confessed to me his ignorance of the early eruption of the first molar, and the fact that the roots are not developed until the tenth year. If such ignorance is found among the profession, what can be expected of the laity?

The greatest danger to the first molar, is neglect of the deciduous teeth, as in such a mouth, the sulci and grooves are attacked during its eruption and the tooth may often have an exposed pulp as early as the

seventh year. (Fig. 92.) When this occurs, even with immediate care, the tooth cannot always be saved. When the tooth is neglected and the child is first seen in the eighth or ninth year where an abscess with a rarified area around the root (Fig. 93) is disclosed by the radiograph, there is no hope of saving the tooth, unless the radiograph shows fully developed roots, and the child is well grown and in vigorous health. Such a combination is rare, as the health of the child declines with the advance of the disease of the tooth.

### Care of the First Permanent Molar.

In general practice, the first step in protecting the developing first molar may often be the dental care of, and advice to, the expectant mother. When first seen her teeth should be given such necessary dental care as will make them comfortable for vigorous mastication. Then she should be put upon a diet consisting largely of fruits, vegetables, coarse breads, milk and eggs. She should be advised to use her food in hard forms requiring vigorous mastication, with plenty of pure water drunk between meals. This will help ward off the onset of gingivitis, which is so common during this period, and which, when neglected, results in pyorrhea in later life.

The dentist should advise more vigorous and frequent brushing of the teeth during this period, and should prescribe alkaline mouth washes, after morning sickness, or acid conditions attending indigestion. Either her dentist, or her physician, should point out the need of a quiet health-giving program of life during the period of gestation.

The second period of care is from birth to the twelfth month. For the healthy infant who is nursed by a healthy mother there is little to fear. Where the infant's health is not good, or, when it is bottle-fed from birth, great vigilance is required.

In the case of poor health, everything should be done to build up in the feeble frame, a resistance to disease, because these are the children who succumb to the diseases of childhood, and, if they survive, erupt hypoplastic teeth which are a permanent record of the period of severe illness.

The dangers of bottle-feeding are a menace not only to the developing teeth but to the race, because of the large percentage of infant deaths.

Unless under the care of a competent physician, the infant may be fed a diet too sweet, or too starchy. Another danger enters with bottle-feeding: that is, malformation of the arches, due to the incorrect shape of the nipple; retaining the bottle too long at the feeding; the habit of sucking the thumb, or fingers where the child is ill-nourished; or the



habit of ignorant mothers allowing the use of pacifiers. One of the evils of bottle-feeding is the practice, frequently found, of giving a bed-time bottle after the child has reached the second or even the third year. This is an especially injurious habit, first, because the malocclusion is increased by the stronger muscular action of the growing child; and second, because the deciduous teeth are exposed to the decomposing food during the night, instead of being protected by a thoroughly cleansed oral cavity.

Another habit to be watched, is the sleeping posture of the infant, which is now thought to have so important a bearing upon occlusion.

All this may seem to have no relation to the protection of the first molar, but where the erupted molars are not in correct relation for mastication, their destruction is very rapid, because they cannot be polished by the friction of mastication.

The third period of watchfulness is when a change is made from a liquid diet to hard foods, which should gradually be reached by the time the deciduous teeth are erupted and in good occlusion.

One of the worst American food habits is continuing to feed a child soft, mushy food requiring no mastication, until the fifth or sixth year. Another habit, nearly as disastrous, is allowing too high a percentage of carbohydrates, and not including enough milk, from which valuable lime and other minerals for developing bones and teeth are derived.

### Oral Prophylactic Measures.

The treatment of the first molar must be divided into two distinct classes. 1. Prophylactic measures which tide over extreme youth, ill health or a period when good care is not given the teeth; and 2, permanent work which includes the restoration of lost tissue by gold inlays and the treatment of the vital, or non-vital pulps, where exposure or disease necessitates it.

In preparing the oral cavity for the advent of the first molar, the deciduous teeth must be put into a healthy condition. All broken teeth, or roots, that cannot be filled, must be extracted, so that there may be no secret spot in which bacteria may incubate. Whenever it is within the power of the dentist, the child should be educated to thoroughly masticate rough, hard food, beginning with whole wheat toast in the second year, and gradually adding fresh, perfect, raw fruits and vegetables, until when the first molars are in good condition, the diet is nearly as varied but not so rich as that of the sensible adult.

The eruption of the first molar is so physiological, that little atten-



tion is paid to it, and surprise is expressed by the average parent when you bring to his attention the fact that one, or more, of these valuable teeth are in position. The parent frequently argues that it is a deciduous tooth, because no tooth has been shed (Fig. 94) to give it place. This



Fig. 94. Shows the erupting first molars.

is a good opening for instruction to the parent, showing how the jaw lengthens distally of the five teeth from the center of the deciduous arch, to make room for the three permanent grinding teeth, which, having no deciduous predecessors, erupt at intervals of six years as the jaw develops. And here also, is the opportunity to discuss the dangers of the undeveloped jaw when the third molar becomes impacted.\* (Fig. 95-96.)

During the eruption of the first molars pathological factors occasionally enter, such as pain, fever, etc., but such cases are rare, and usually are found in the child whose vitality has been greatly lowered by disease, or ill-advised feeding.

A few weeks before a tooth is to erupt, the surface over the erupting tooth may be swollen and a blue black in color. There is rarely any pain or soreness. These conditions occur in a mouth where soft food is used, and is more often found over the upper molars, than over the lower

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\*See Chapter on "Prevention of Malocclusion."

ones. A small opening, to permit the escape of the stagnant blood, and painting the cut with iodine is usually all that is necessary, but, if there is



Fig. 95.

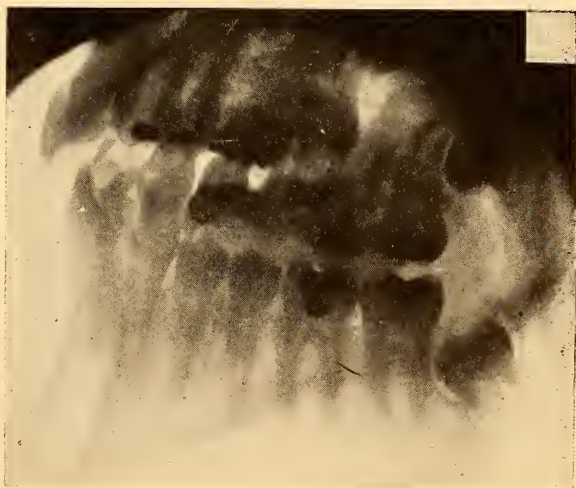


Fig. 96.

Fig. 95-96. Impacted third molars of a twelve-year-old girl causing the anterior teeth to move forward and over-lap.

pain, it is often advisable to remove completely the overlying tissue, as in lancing over a deciduous tooth.

The increased flow of blood to the erupting tooth, is very liable to

precipitate any incipient trouble about the second deciduous molar. If there is a large filling near the pulp, particularly if it is of silver amalgam, this increased flow, affecting the deciduous pulp to a certain degree, may cause its strangulation and death, even if for two or three years it had been in good health so that the tooth was serviceable. Where the pulp of the deciduous tooth had been removed, previous to the eruption of the first molar, apical disturbances frequently occur, and a fistula may appear on the gum. In such a case, unless a radiograph shows marked destruction of the roots, root canal treatment\* should be resorted to in an effort to preserve the deciduous molar for the six years it should remain for service. These conditions are usually found in a mouth where the teeth are not given sufficient exercise.

Where the lower molar erupts before the upper molar, the lobe of gum tissue over the distal portion of the tooth, and extending into the sulcus, often becomes inflamed and sore from the decomposition of food in the grooves. If such a condition does not respond to one or two applications of iodine it is best to excise the overhanging soft tissues, and resort to some prophylactic measures to preserve the enamel in the grooves from disintegration.\*\*

In considering the recent discussion upon the best way to preserve these teeth, and my deductions from the large number of children I have watched, I am free to confess that I have arrived at only one decision and that is, *stop candy eating and chocolate drinking*. Among my prophylactic patients, I have a fair percentage with perfect first molars, but these are the result of constant vigilance and a rigid restriction of sweets and starches. When the average, well-cared for city child reaches fourteen or fifteen years of age, there is such a marked increase in his addiction to soda fountain and candy store "*first aids to indigestion*," that these carefully cherished teeth begin to break down. The *points of susceptibility* vary greatly according to the food and mouth hygiene habits of the child. Where the child is upon a careful diet with good habits of mouth hygiene, but is a lollypop addict, the only cavities in the mouth are frequently in the lingual pits at the end of the disto-lingual grooves of the upper molars. Where the child is a chocolate drinker and a lover of soft, sweet food, the buccal pits of the lower molars may be so large as to cause pulp exposure, and there may be no other pathological condition present except gingivitis, which may range from a slight redness, where the diet unbalance is not great, to chronic, swollen purple

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\*See Chapter on "Treatment of Abscessed Deciduous Teeth."

\*\*See Chapter on "Prevention of Malocclusion."

gums, where the child is suffering from a heavy overbalance of carbohydrates.

Contrary to general belief that the occluding surface is first attacked "in the cared for mouth," the buccal pits of the lower molars and the lingual pits of the upper are the first points of attack, if the child is a candy eater. So we call these the "candy holes." Fortunately, when these are pointed out to the parent he puts a curb upon the appetite of the child for sugar. If the upper molar has the troublesome fifth cusp the surrounding groove begins to soften soon after eruption, in the mouth of the candy eater.

Where the patient is coming for monthly oral prophylaxis, which I believe to be the right of all school children,\* these grooves and pits may be protected by polishing with pumice and wooden points, and an addition to the diet of harder and coarser bread, such as crusts of whole wheat bread, Swedish bread, triscuit or educator crackers, thoroughly and vigorously masticated, and raw carrots, celery or apples.\*\*

I have never seen any good results from gum-chewing, advocated by some, as the salivary glands have sufficient work, if the diet is hard and dry. The necessary milk should be drunk after the hard foods have been eaten, and all water should be drunk between meals, in particularly large quantities night and morning.

In the mouth where the *deciduous molars are neglected* the two spots most susceptible to caries are the mesial surfaces of the first permanent molars and the occluding surfaces.

When the cusps of the first molar break through, the greatest care must be taken to protect all the grooves, because the starches and sweets pack under the gum and are allowed to ferment. Even if the gum is not painful, in a *susceptible mouth* it is often wise to remove all overhanging tissue and give prophylactic treatment. This treatment differs according to the location of the susceptibility. In all mouths the beginning of the eruption of the first molars should cause increased care to be given to all teeth. The periods for oral prophylaxis should be at more frequent intervals, and special attention should be given to the distal surfaces of the second deciduous molars so that the erupting first molars will have contact with smooth, highly polished surfaces.

A strict supervision of diet must be undertaken until the four molars

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\*"What We Are Doing in Mouth Hygiene on the Pacific Coast" by M. Evangeline Jordon, *Transactions of the Fourth International Congress on School Hygiene*, Buffalo, August, 1913.

\*\*"The First Line Trench in Dentistry" by M. Evangeline Jordon—*Dental Cosmos*, September, 1918.



are in occlusion, as the starch from white crackers, starchy mushes, cookies, soft graham crackers, etc., pack under the flap of gum, and the fermentation set up softens the enamel. When this condition is discovered, cleanse the tooth and teach the child to keep it clean with cotton wrapped around a toothpick. At night, after the cleansing, have him take a piece of carbonate of magnesia the size of a pea, and press it under the edge of the gum. Such a patient should have weekly observation. If at such a visit, the finest explorer will catch in the fissures, excise the overhanging tissue at once. The upper left molar in Fig. 94 shows a band of tissue that should be removed because decomposing soft food may be held under it. In two days the gum will generally be sufficiently healed so that the surface of the tooth can be worked upon. Polish the grooves and sulci with pumice until any deposit is removed and then give a treatment of nitrate of silver.\* Repeat the treatment in two or three days. In a week's time, if the tooth is still found coated because the proper home habits have not been established, following your directions, or because the child has infected tonsils, or other pathological interferences to a healthy oral cavity, the next prophylactic step is to be taken. Dry the tooth and cover the surface with thin cement, filling all grooves but leaving a tooth surface smooth so that no debris will find lodgment. The black copper cement seems useful, but should not be used if there are any pits showing caries, as the black cement stains the dentin but does not inhibit caries.

Whatever may be resorted to in clinics, in private practice no one is justified in using *any filling* until all other measures have failed. Copper and cement fillings must be classed as prophylactic measures and not as permanent work. Copper amalgam is the best of all prophylactic fillings and will preserve more teeth because it adheres closely to the margins, does not change in form, and because of the antiseptic nature of its salts, when dissolved in the saliva.

When widening fissures in the occluding surfaces was first advocated, I tried this method in an effort to preserve the tooth without a filling. I selected a number of cases. Some of them I ground out with the smallest stones, but not liking the result, I used sharp, round burs for the others. I watched these cases, but within two years each tooth needed to have the surface permanently restored with an inlay.

#### Filling Pit Cavities.

If, despite every vigilant care, a carious pit does develop, it should be filled. My experience is that nothing is better for this purpose than *copper amalgam* used in as hard, dry form as possible and packed in with considera-

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\*Howe's.



ble pressure. All the caries *must be removed* from the pit, and the cavity extended in the enamel to the end of the fissures. Use a 33½ inverted cone bur in the right angle hand-piece and a slight undercut may be made *in the enamel*. When completed, the filling is a mere thread, filling the deeper fissures, but in no way interfering with the occlusion of the teeth when fully erupted. Such a filling will last for years, and several such cases have gradually worn away leaving a healthy occluding surface. But as a rule, if the softened spot has gone much below the dento-enamel junction, in a few years it will be necessary to replace the copper amalgam with a gold inlay.

I have seen base plate gutta-percha advocated for use in this way, but it will not remain unchanged in form as copper amalgam does. The vigorous mastication of hard food soon displaces, or wears away gutta-percha. I have tried using silicates, but more cutting is necessary. I occasionally see a patient for whom a silicate cement filling has been inserted by a dentist previous to visiting my office, but in most cases the filling is cracked, or an explorer will enter between the filling and the end of the groove. Of course it is obvious that, if an explorer can penetrate the surface, the tooth is in danger from bacterial invasion through the tiniest opening. I do not think that silicate cement can be depended upon to remain unchanged. As a filling for the mesial cavity silicate cement is a failure, as it disintegrates when in contact with the soft tissues of the gingivæ. The same is true in approximal cavities in bicuspid early in life.

**Treatment of Mesial  
Surfaces of First  
Molars.**

The mesial surfaces of the first molars must be carefully watched for signs of caries. In a mouth where the deciduous molars are carious these surfaces seldom escape early destruction. Early in my practice I tried the method, often advocated, of cutting away a wedge shaped portion from the distal surface of a carious deciduous second molar, to protect the mesial surface of the first permanent molar. I soon abandoned such practice as the space could not be kept clean, and the pressure of mastication often injured the gum tissue. If the deciduous molar is only to be kept a short time, I fill the cavity with cement, and keep it under observation. If the tooth is to remain more than two or three months it is best to insert a copper amalgam filling. As a rule, while the second deciduous molar is in position, the more conservative measure of introducing a prophylactic filling of copper amalgam in the permanent tooth, instead of at once inserting an inlay, is valuable for two reasons: First, with a young child, cavity preparation for a gold inlay in this location with the deciduous tooth in position, is difficult, particularly at the

cervical margin, as the first molar is still embedded in gum tissue, from which it will stand free after the deciduous molar has been shed. Second, the distal surface of the deciduous molar is broad and flat, and it is difficult to build a contact point that will stand the wear, and protect the margins of the inlay, in the mesial surface of the permanent molar.

After removing all caries, but making no effort toward extension for prevention in the permanent molar, both cavities should be filled with copper amalgam. The cavity in the mesial surface of the permanent molar should be filled, and the separation held with cotton so that when the filling in the distal surface of the second deciduous molar is put in, the next day, there will be close contact between the teeth. These fillings can be left until the deciduous tooth is shed, when the copper amalgam in the permanent molar must be replaced with a properly shaped inlay *before the bicuspid erupts*. The patient is instructed to return as soon as the deciduous tooth becomes loose, and is warned that if the bicuspid erupts and covers the temporary filling in the molar, a loss of tooth structure will be necessary in cutting an M. O. cavity. We seldom find this advice unheeded, as no child cares to suffer unnecessary cavity preparation.

### Permanent Fillings.

The only perfect filling for a first molar is a gold restoration. As a rule, a gold inlay is indicated, but there are a few exceptions, where a malleted gold filling may be inserted as easily and give as good service as an inlay. These cases are limited in number, as few children under eight or nine will remain quiet enough, with the rubber dam in place, to make possible a filling with perfect margins. Where conditions permit, there are small cavities where the foil filling is indicated. First; where the buccal pit in the lower molar is not connected with the occlusal surface by a well defined groove. In working for children, as it is wise to extend the cavity as little as possible, such a pit may be filled with malleted gold foil without an extension to the occlusal surface. Second; where the mesial sulcus in the upper molar is carious, and the grooves are not well defined, a small malleted gold filling may be inserted. Third; frequently the sulcus in the occlusal surface of the disto-lingual groove of the upper first molar, may require a filling without the need of extending the cavity over onto the lingual surface. With many children, the mouth cannot be opened wide enough to give freedom for work, and a tiny prophylactic copper amalgam filling must be inserted until the child is older. In a larger mouth, where the same condition exists, the sulcus may be filled with a tiny malleted gold filling. Fourth; in bicuspid, small occlusal groove or pit fillings

of gold foil may be easily inserted without extensive cutting of the healthy tooth tissue.

In the majority of cases, simple occlusal cavities may be filled permanently with a gold inlay as soon as the need of a filling is discovered.

In filling buccal cavities in the lower molars, it is often necessary to fill with cement until the tooth has emerged through the gum sufficiently to give a good view of the cervical margin.

In omitting silver amalgam fillings from the list of permanent fillings, any one who has watched the results of these makeshifts in the mouths of young children must agree, that the large percentage of failures put them *outside the class of permanent restorations*. Any filling that does not prevent recurrent caries, cannot be considered a dental remedy. It is a sad comment upon silver amalgam, to say that a very large percent of such fillings, placed before the child is ten years of age, must be replaced within two or three years, and the worst feature of such treatment, is the very large number of exposed or diseased pulps, found upon the removal of such fillings.

**Psychological  
Advantages of  
Gold Inlays.**

The ease with which a gold inlay may be placed in the molar, and the permanence of the restoration, are not the only advantages. Very early I recognized the prominence of psychology in working for children. One of the most valuable, if not *the most valuable*, result of the gold inlay is the esthetic effect upon the mind of the child. Unless there is built up in the *mind of the child* an intense admiration for his teeth, it is never possible to inculcate habits that will protect them. For this reason, very many molars are so well cared for, that they never need a filling, because of the pride of the child in his beautiful teeth. If, before this esthetic attitude has been established in his impressionable mind, there is necessity for a restoration of lost tissue, the gold inlay should be inserted, because, the earlier the impression can be made that these teeth should be given the best care possible, the more valuable and lasting it will prove. When the prophylactic copper amalgam has been used, the thought should always be kept before the child that, just as soon as conditions are changed, these black fillings will be replaced by inlays which are beautiful *because they most nearly restore the tooth to its original form, and if given proper care will last an indefinite time*. Their duration will be determined by conditions over which the operator has no control. The child's eagerness for that improvement in his appearance, is a great aid in establishing good habits of oral prophylaxis and diet. To this statement I hear many objecting that not all children can have gold inlays. Put such

a thought out of your mind. Any child who wants an inlay, instead of some quickly inserted substitute, will get it. The large number of boys who have sold newspapers, or who have followed some other occupation during school vacation to pay for replacing prophylactic copper amalgam fillings, with permanent gold inlays, is surprisingly large. The girls who have given up luxuries, such as jewelry and extra dresses, in order to have beautiful teeth, is equally large. It all lies within the mind of the

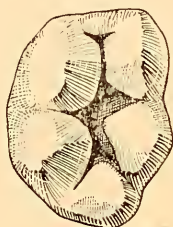


Fig. 97.

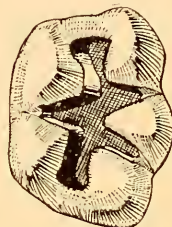


Fig. 98.

Fig. 97. Simple occlusal cavity in first molar.

Fig. 98. Conservative preparation of such a cavity bringing the cavity outline to the extreme points of the fissures to insure against future decay.

*operator.* If *he* is convinced that a good gold inlay is best for the tooth he will not be able to dissuade his client from having it.

If the candy habit has not been broken before this time, after the inlay is set, whoever pays for it sees that the time to break bad habits has arrived. If the child has paid for his inlay from his earnings, or allowance, his chances for a long, healthy life are greatly increased, because he is not going to neglect, or misuse an actual investment of time and money, for which he has had to make sacrifices.

#### Cavity Preparation for Gold Inlays.

In preparing a cavity for an inlay, more attention must be paid to the conservation of tooth structure for the child, than when working for an older patient.

Frequently, if the future of the tooth is to be considered, it is better to step in an inlay, or make an M. O. or a D. O. in two sections, than to cut away enough structure to allow the drawing of the pattern for one restoration.

In bicuspid which must be restored under the age of fifteen, great conservation of tissue must be practiced. Do not use a chisel in the occlusal surface of such a bicuspid or molar, but use small fissure burs and widen as little as possible.



With the above exceptions the technique for inlays for children, does not differ from any good method. For that reason I shall not touch upon the construction of inlays by the direct method but shall quote the simple technique for the indirect method advocated by Dr. B. B. McCollum. In many cases we find this method very advantageous.



Fig. 99. Compound rolled to a point, so that it will reach all parts of the cavity allowing the air to escape, so that there will be no defects in the impression.

### Method for Making a Gold Inlay.

The placing of a cast gold restoration in a permanent tooth for a child under fifteen, does not differ materially in cavity preparation from a restoration in an adult's tooth.

In simple occlusal cavities in molars or bicuspid, it should be the aim of the operator always to conserve the tooth structure. (Fig. 97.) Fissures, grooves and pits should be cut out, with as small a fissure bur as access will permit. The structure of the enamel here does not demand a bevel of the margins. The fine fissures, or enamel defects, may be followed out by bringing the cavity outline to their extreme points as in the illustration, thus further saving tooth structure but insuring the tooth against future decay. (Fig. 98.)

When the cavity of decay has penetrated deep into the dentin and has encroached closely upon the pulp, the rubber dam should be applied, all the softened dentin removed, the cavity dried and sterilized *and resterilized* with 95% phenol and a good bed of Smith's copper cement placed, to protect the pulp from pressure in taking an impression of the cavity. After placing the cement, prepare the cavity as though cement were dentin. It



is dangerous to take impressions of deep cavities, without first placing a bed of cement, because the pressure may break through the thin dentin and injure the pulp. It is gratifying to see how quickly the pulp will recede from a cavity of decay in a child. Many a cavity will be found in a permanent second molar at the age of fourteen or fifteen, that has penetrated



Fig. 100.



Fig. 101.

Figs. 100-101. Complete impression of the occlusal surface of the tooth.

one or two millimeters past the normal position of the pulp without an exposure, because the great activity of the odontoblasts has built in dentin to protect the pulp.

**Taking  
Impression  
of Cavity.**

To take the impression of a cavity in the occlusal surface of a bicuspid or molar, use a piece of Kerr Perfection Compound Stick about  $\frac{1}{2}$  or  $\frac{3}{4}$  inch long. Warm the end of the compound stick in a flame, and bring it to a point by shaping it with the *wet* fingers. (Fig. 99.) Do not soften the whole piece, just enough to form a point. When this is done, quickly heat the immediate point in the flame to almost a liquid state, (quite hot), carry immediately (without passing through hot water) to the tooth and insert the point into the cavity and apply firm pressure. The hard unheated portion will force the soft compound into the most intimate contact with all portions of the cavity. The point will allow the compound to enter deep into the cavity and the air to escape, thus avoiding defects in the impression. This will also give a complete impression of the occlusal surface of the tooth. (Figs. 100 and 101.) In large molars, it may be necessary to use a stick of larger diameter than the regular size, by moulding two sticks together. It is necessary that an impression of the entire occlusal surface of the tooth should be obtained.

**Technique for  
Wax Pattern.**

Surround the impression with a sheet of wax, and bury in plaster in a rubber or metal ring. When the plaster has set and cooled, pack an amalgam die, using Garhart's Special Inlay Alloy.

Carefully lubricate the surface of the die with equal parts of glycerine and castor oil and wipe off *all* the excess. In a spatula melt some inlay pattern wax and pour into the cavity. When the wax has "set," but be-

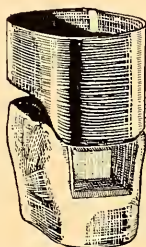


Fig. 102. Copper band fitted to cover entirely an M.O. or M.O.D. cavity.

fore it is cold, put firm pressure on it with the thumb or finger, and hold firmly until cold. With an explorer, remove the wax from the cavity and see that it is a homogeneous mass, and that it appears to have penetrated to all parts of the cavity. This being satisfactory, replace the wax in the die and place the die (with the wax in it) in warm water, about 120 degrees F., for from two to five minutes. Take out of the water and chill in tap water. Remove the wax from the die and wash off the surface of the wax with acetone. Re-lubricate the die carefully and slightly warm it. Now add a very small quantity of wax to the "ends" of the pattern (that is the longer parts that go into the grooves and fissures) and quickly press firmly into the warmed (not hot) lubricated die. Hold firmly until cooled.

Now the pattern may be carved to anatomical form, without any regard to the occlusion in the mouth. The cusps and enclined planes must be most truthfully and anatomically reproduced. Herein lies the joy of working for a child. If we form an occlusal surface that is anatomically correct, and there is no orthodontic defect which Nature cannot overcome, the tooth will take its proper relation to the opposing teeth and all the demands of Nature will be satisfied.

Such a restoration should be made of the hardest alloy obtainable that will cast accurately. A pattern so made will insure a casting that will fit the tooth. All the finishing should be done in the die, using small inverted

cone burs to finish the deeper grooves, and round burs or stones to finish the margins.

When the inlay is set, it should be polished first with fine pumice on a porte polishing brush in the dental engine, and the final polish made with the brush and chalk.



Fig. 103.



Fig. 104.

Fig. 103. Thrusting a number 3 explorer into the deep portions of the cavity, through the impression, to release any air that may have been confined by the compound.

Fig. 104. Using the warmed handle of the explorer as a plunger to force the compound into remote parts of the cavity after the air has been released.

If the occlusal surface of the tooth is imperfect, as frequently occurs with hypoplastic first molars, a band should be fitted to the tooth extending just to the greatest diameter of the convex surface of the crown, and the compound impression made in the same way.

#### Technique for Approximo- Occlusal Cavities.

The treatment of an approximo-occlusal, or M.O. or D.O., cavity in a bicuspid or molar requires the same thoughtfulness for the conservation of tooth structure as do the plain occlusal cavities.

At no time is it necessary to destroy extensively, nor deeply, unless decay has done the destruction before us. Practical courses in cavity preparation should be pursued religiously until skill and technique are at the finger tips. It is a burning shame to mutilate a child's tooth, and it is totally unneces-

sary if the operator has a *mental picture* of his finished work, before he begins cavity preparation.

When the cavity has been prepared, a copper band is fitted to cover the entire cavity and festooned to conform to the contour of the tooth as in Fig. 102. The edge of the band should not extend gingivally past the largest part of the tooth, and should fit closely. (An M. O. D. cavity simply requires the band to extend down on each approximal surface to the gingival margin.)

The fitted band is filled with impression compound, and the flame applied to the edges to sufficiently melt the compound and cause it to adhere to the copper. This is important; if not done the compound peels off the band on removal from the tooth, and spoils the impression. The band, with the heated compound, is quickly carried to the tooth and pressed to position. As soon as in place a number 3 explorer is quickly thrust into the deepest portions of the cavity *through* the compound as in Fig. 103; then, the explorer handle being previously warmed (not hot) is used as a plunger to force the compound into the deep recesses of the cavity. (Fig. 104.) The puncture made by the explorer lets the air out, so that the compound enters the most remote and difficult parts of the cavity. Pressure with the thumb or finger is then applied and kept up for at least three minutes. Then the compound must be chilled with tap water, and allowed to cool for four or five minutes longer.

Carefully remove the impressions by using instruments on each side and see that no side or lateral motion is applied to distort or break the margins.

Make the die and prepare the preliminary wax pattern, as for an occlusal cavity. Take the preliminary pattern on a number 3 explorer, ready to carry to the cavity, and with a ball burnisher melt the approximal portion of the wax sufficiently deep to allow the approximating tooth to make an impression without distorting the mass of wax. Press the wax firmly into the cavity and allow it to cool. Then heat the occlusal portion of the wax with the ball burnisher sufficiently deep and fluid so that the opposing teeth will occlude and form an occlusal surface in the wax without distorting the whole mass. To prevent distortion it is necessary to heat quickly and rather deeply the occlusal surface of the wax. Carve off the excess wax, remove the pattern from the tooth and replace it in the die.

Carefully examine the margins. If there is a discrepancy there has been a distortion, or the die is incorrect. Correct the pattern if it is needed and try it again into the cavity. If the pattern fails to fit the die, after

being in the cavity the second time, the die is wrong, and a new impression and die should be made.

If the pattern shows that the die is correct, then a careful study of the contour, form, and relation of the tooth to be restored should be made. This method admits of unlimited possibilities, as the pattern may be added to, or taken from, as often as necessary to get the desired result. The approximal contour may be developed to its fullest, thus assuring a relation with the approximating tooth, that carries with it all that the operator knows about the subject. The delicate approximal surface of the pattern is not destroyed by having to insert instruments blindly between the teeth, and the finished inlay has a surface that promises the most for the long life of the septal tissues.

The finishing and polishing can and should be done in the die, thus preserving the delicate margins and fine lines of carving on the occlusal surface.



## CHAPTER XII.

### Amputation of Pulp in Undeveloped Permanent Teeth.

A careful and complete diagnosis is necessary in determining the treatment to be followed where a tooth, with an undeveloped root, is found to have an exposed pulp. This condition is more often found, as the result of accident in the incisors, and of caries in the first permanent molars.

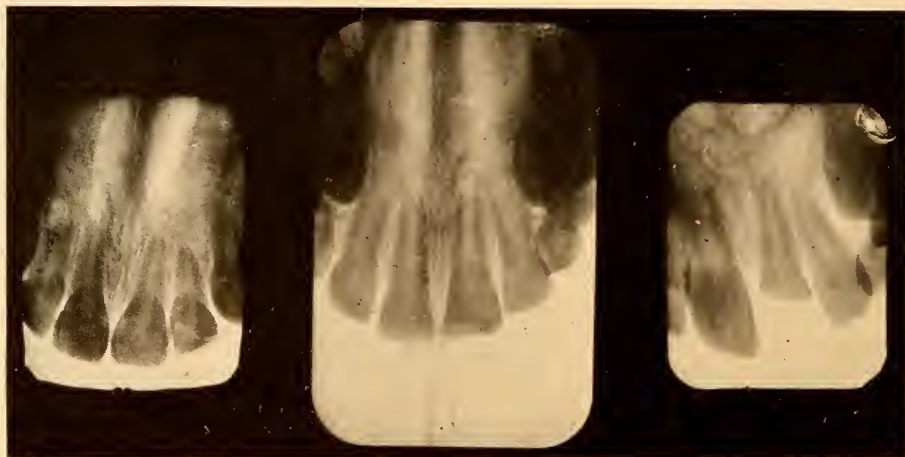
The central incisors are frequently injured by a fall or blow. If the tooth is not broken and there is no pulp exposure, where root development is not complete, there seems to be evidence that the hyperemia resulting from the accident, does not necessarily cause the death of the pulp. Even where the hyperemia at first causes the tooth to appear darker, it gradually clears up and the tooth seems to be normal.

It is more conservative to keep such cases under careful observation, instead of opening at once into the pulp chamber, if the child is under eleven or even twelve provided that a radiograph shows the root ends not fully developed.

A radiograph is of great value in these cases, and should be made as soon after the accident as possible. While a radiograph will show no difference between a hyperemic pulp and a normal one, it will, if properly made, show the stage of development of the root-end, and will make a record of the tissues surrounding the root, that may be of untold value in determining the course to pursue in future treatment. Frequent radiographs are almost a necessity in the follow up of all such cases. If the original conditions of the investing tissues are recorded, small or large, abnormal foramina or unusual bone structures, will not be mistaken for a retrograde or degenerative change, or an apical infection. Fig. 105 shows these cases and the general appearance of many teeth radiographed after accidents.

In a practice among the better class, where the children of the family are given special attention, one seldom encounters a broken incisor that

has been neglected until the pulp has died. It is well to conduct a charity practice on all such cases that you can find. This prepares you to treat with intelligent certainty of results, the accidental and unusual case that comes into your private practice. Where the root is undeveloped and the pulp is abscessed every effort should be made to treat and fill the tooth,



A.

B.

C.

Fig. 105. Various radiographic appearances of young teeth fractured by accident. A. Left central, pulp putrescent, tooth badly discolored. Very little radiographic evidence of infection. B. Right central incisor fractured by a fall. Acute abscess, but no radiographic evidence of infection. C. Same age as B. Note difference in root end development.

but if a fistula has formed the prognosis is unfavorable.\* It is very unwise to retain such a tooth if it cannot be made perfectly healthy, because, if left, it may be the focus from which systemic infection of a serious nature may result.

#### Technique for Pulp Amputation.

Where the crown of the incisor is broken and the pulp is exposed, the patient is usually seen very soon after the accident. In such an event there is little danger of bacterial invasion of the pulp and its amputation has every chance of being a success. (Figs. 106 and 107.)

It is absolutely necessary to apply the rubber dam.\*\* If the tooth is

\*See Dr. Ottolengui's history of such a case in May, 1924, DENTAL ITEMS OF INTEREST.

\*\*I am indebted to Dr. B. B. McCollum, of Los Angeles, for much of the material used in this chapter.

broken in such a way that this is difficult, or impossible, then cauterize the exposed end of the pulp, thoroughly, with 95% phenol, and cover it over lightly with "wonderpak"\* or medi-cement which sets upon the application of moisture. Then carefully fit a band made of gold, to engage the broken edge of the tooth, even though the break goes under the gum margin. In some cases it may be necessary to inject a little local anesthetic

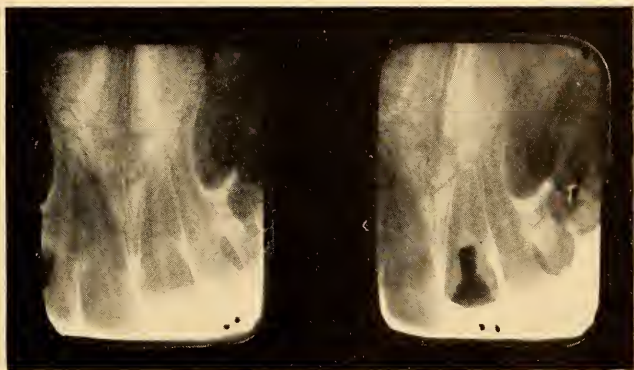


Fig. 106.

Fig. 107.

Fig. 106. The incisal edge of the central incisor was broken and the pulp exposed.

Fig. 107. The pulp was immediately amputated and has been normal for a year.

and trim away the gum, to admit of fitting and cementing the band to place. The incisal end of the band is left open and the occlusion should be adjusted before cementation. If the incisal end of the band is covered over with temporary stopping while the band is on the tooth, and this covering is removed with the band, it will assist in causing the cement to flow in between the band and the tooth at the cervical region when the band is filled with rather thin cement and gently forced to place, as this covering closes the end of the band and causes the cement to flow where wanted.

When this cement has set and the excess has been removed (it should have at least 30 minutes to harden) the rubber dam may be applied with ease, to even the most badly broken tooth that it is possible to treat at all. With the rubber dam in place, remove the temporary stopping from the end of the band and carefully clean out the cement down to the material

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\*Wonderpak—Equal parts of zinc oxid c.p. and resin mixed with oil of cloves containing five per cent of sepal.

covering the pulp. If there are any defects in the cementation of the band it is necessary at this time to look for and correct them. One of the most delicate surgical operations possible, is about to be undertaken and a sterile, dry field is essential to its success.

Sterilize the tooth and the surrounding rubber dam with a thorough application of iodine, followed with a wash of pure alcohol. Expose the pulp end with a sterile instrument. Be sure the pulp is exposed, then anesthetize with pressure anesthesia, using cocaine or procaine *without* adrenalin or suprarenalin. This is important.

With a new, sharp, round bur of suitable size, dipped in formocresol,\* remove the pulp tissue from the coronal portion of the pulp chamber, using no pressure, but allowing the bur to advance only by cutting a clean path before it. Check the bleeding with repeated applications of formocresol. The pulp should be amputated as far up the canal as the angle of the entrance will permit, without undue mutilation of the crown of the tooth. As the canal is encountered the size of the bur should be smaller and repeated inspections should be made to be sure that the canal is being followed. In some cases, where the canal is round and the angle of the crown admits of a straight entrance, a *large* size barbed broach may be used to amputate the pulp high up in the canal, even to the apical third, or farther.

Use formocresol as a styptic, to check the bleeding, and when the point of amputation is reached, make application of formocresol on cotton for a few minutes. Then carefully remove all the clotted blood covering the pulp end. This may precipitate a hemorrhage, or a weeping of serum. If it does, gently apply more formocresol with a very light touch until the bleeding or weeping ceases, and again carefully remove the clotted blood or coagulated serum. This may require repeated treatments, but it is necessary to have a cauterized pulp free from clotted blood, or coagulated serum. Only patience and perseverance will accomplish what is necessary to a successful operation.

Finally, clean the walls of the empty part of the canal and the pulp chamber with alcohol, gently bathing off the pulp stump with the alcohol, and dry the cavity with warm (not hot) air. Then flow, or very gently pack, a thin layer of a paste made of thymolized calcium phosphate and formocresol over the pulp stump. Absorb all the excess liquid of the paste, by repeated applications of cotton pellets, using very little pressure. Be sure that the cavity walls are free from any of the paste, as its presence will prevent the cement from adhering. The walls should all be freshened

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\*Formula of J. P. Buckley, Ph.G., D.D.S., Eli Lilly & Co.



with a small, sharp, round bur, or better still, a small Buckley pulp chamber bur. When this has been accomplished, cut a groove in the dentin with a small wheel bur just away from the layer of paste covering the pulp. This groove must be carefully filled with the cement which is to seal the tooth. Pack the cement very carefully, and fill the entire cavity without air pockets. The groove will prevent any displacement of the cement and will insure the permanent sealing of the end of the canal.

Send the patient immediately for a radiograph. These cases must be carefully watched, and it is often just as well to rebuild the cement from time to time until the accident period of the child has passed, as another accident of like nature often occurs. In older patients, it is advisable to restore the tooth with porcelain as permanently as possible.

When I first followed this technique as advocated by Dr. B. B. McCollum, since 1918, I could not believe that when the effects of the anesthetic had passed away there would be no pain, but in the many cases of pulp amputation which have been done in my office, not one has had a postoperative history of pain. In rare cases a very slight pericementitis may follow the operation but it passes away in 48 hours or less.

**Pulp Exposure  
in First Molars.** Exposure of the pulp, due to caries, in the first permanent molar is frequently found between the ages of seven and ten. These exposures are of two classes. First; the exposure due to an entire neglect of the tooth, which may be laid at the door of the parent. Second; the exposure that is caused by the caries left under a filling, or where bacteria have entered at the margin of a leaking filling. This is entirely the fault of the dentist; first, because of careless work; or, second, because he has not changed the habits of the patient so that his repairs have had adequate protection. The largest percentage of these failures are from the use of silver amalgam fillings. In many tiny pit, or groove fillings, where all caries has not been removed, the parent, having confidence in the dentist, considers the tooth safe until the child complains of pain, or until a more critical dentist detects some discoloration in the enamel surrounding the filling. The removal of such a filling frequently discloses a soft mass of caries, which, when excavated, shows a pulp exposure. Often, slight exposures may be capped and watched, but many require more drastic measures, especially if the exposure is large and the floor of the cavity is darkened; such a condition is frequently found under large, leaking amalgam fillings in the lower first molars.

**Pulp Amputation  
in Molars.**

Where the floor is found dark from a caries stain, there is always the question whether, if all stained dentin were removed an infected pulp would



not be found. Even if root-end formation seems to be complete there is a greater hope for the future health of the tooth if the bulbous portion of the pulp can be removed in an aseptic manner rather than to leave it under a capping for the slow death which is certain to follow infection of the pulp. (Figs. 108 and 109.) If diagnosis discloses a vital pulp, although some pus is found, amputation should be resorted to at once. Many of these teeth are so broken that a gold band must be placed around

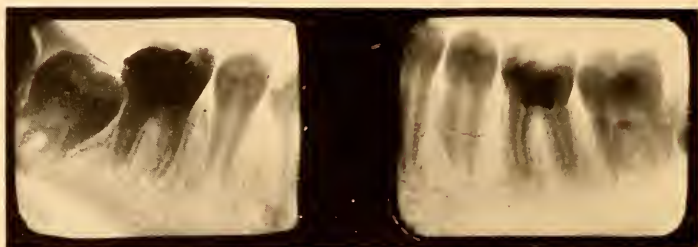


Fig. 108.

Fig. 109.

Figs. 108-109. First molars with undeveloped roots where exposure of the pulps necessitated their amputation.

the tooth before the rubber dam can be applied; otherwise the amputation of a molar or bicuspid is really easier than an incisor. The technique of preparation, rubber dam, sterilization and anesthetizing are the same.

When this is complete it is easy to remove the bulbous portion of the pulp from the pulp chamber with a sharp, round bur, cutting off the pulp at the mouths of the canals. Formocresol quickly stops the bleeding. With a small, round bur, enter the canals to a depth of at least  $1\frac{1}{2}$  mm. or 2 mm. Use formocresol as a styptic to stop the blood. Treat each canal separately and very carefully remove the clotted blood or coagulated serum down to the cauterized pulp end. This is the most important part of the operation. When this has been done wash and wipe out thoroughly with alcohol and dry with warm air. Cover the pulp ends with the paste of thymolized calcium phosphate and formocresol and absorb all the excess liquid with cotton pellets as in incisor teeth. This will fill the canals about to the level of the floor of the pulp chamber. Carefully remove all paste from the walls of the cavity, cut a groove just inside the mouth of each canal with a small wheel bur, and freshen all the walls with a bur, or spoon excavator. Fill the entire pulp chamber with cement, avoiding air pockets and packing the cement well into the grooves. The more quickly the tooth is permanently restored to form and function, the better for the mouth.

As I have already stated, the technique for pulp amputation which I have described, is the same as that which has been advocated by Dr. B. B. McCollum since 1918. It is with pleasure that I am privileged to introduce here, the history of the case which inspired Dr. McCollum first to undertake the preservation of a part of a pulp, together with a remarkable radiographic record of one of his patients.

Dr. McCollum describes the case which first caused him to suspect the possibilities of pulp amputation as follows:

"In May 1916, Dr. S., then a student in dental college, came to me for treatment. The teeth in question had large, leaky amalgam fillings. Radiographs taken at that time showed unfilled root canals. On opening these teeth (lower molars) which had been treated several years previously (with arsenic for twenty-four hours and then the coronal portion of pulps removed, pulp chamber filled with paste, and, tooth plugged with amalgam)—the pulp remnants in the canals were found to be vital and bled freely."

This, and similar experiences with other teeth in the same patient's mouth, finally awakened Dr. McCollum to the significance of what he was seeing. On June 11th, 1916, Dr. McCollum opened into a lateral incisor (for same patient) and found the pulp alive. After some discussion the two dentists, patient and operator, decided upon the experiment of recovering the pulp stump and then watching the result. The hemorrhage from the disturbed pulp stump was stopped, the amputated end treated as described, and the tooth carefully sealed. A porcelain jacket crown was placed on the root and is in good condition today, the pulp apparently being still alive.

After this, Dr. McCollum began cautiously to practice pulp amputation. The following case history, with the accompanying radiographs, proves the possibilities of this operation in young teeth.

<p><b>Dr. McCollum's Case of Pulp Amputation.</b></p>	<p>During the Christmas recess, in 1917, Miss S—— aged 10, applied to Dr. McCollum for treatment. Examination showed very large cavities, in both lower first molars, involving most of the occlusal and part of the distal approximal surfaces. Despite the ravages of decay, the teeth had ached very little. This fact, coupled with the youth of the subject, the importance of the two teeth and the evident good vital resistance of the girl, induced Dr. McCollum to attempt pulp amputation, and the preservation of the pulp tissue within the canals.</p>
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It should be mentioned that radiographs, (which unfortunately have been lost) showed that there was no bone destruction which would in-

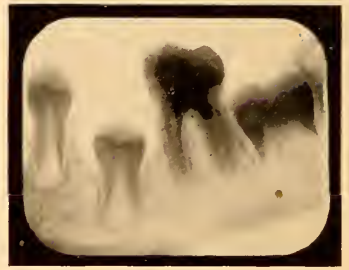
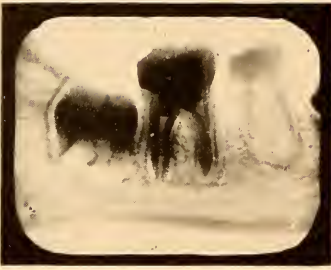


Fig. 110. January 3rd, 1918. Lower molars, right and left, immediately after root amputation.

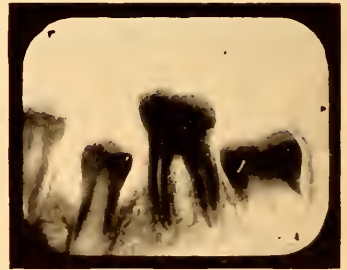
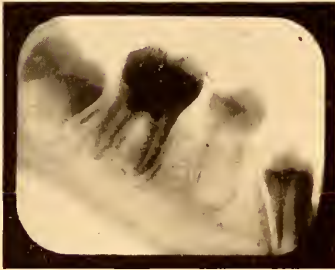


Fig. 111. Same case; February 16th, 1918.

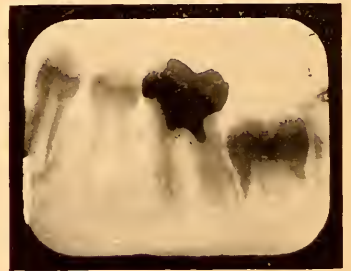
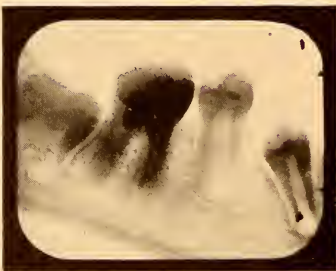


Fig. 112. Same case; May 16th, 1918.

dicate the presence of infection. Slight radiolucent areas were noted about the apices, but this was undoubtedly due to the fact that the root apices had not yet been fully developed, and that a remnant of the tooth follicle was still present. In other words, the radiolucent areas were in no way different from typical pictures of this stage of root development.



Fig. 113. Same case; March 5th, 1919.

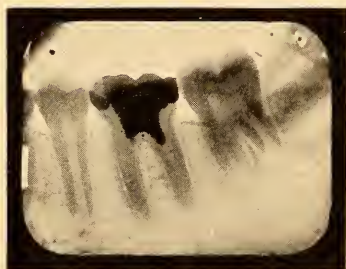


Fig. 114. Same case; May 8th, 1920.

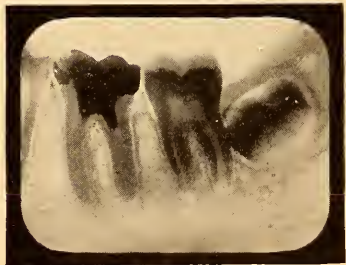
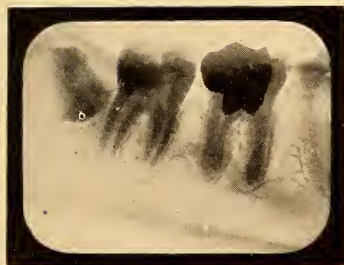


Fig. 115. Same case; November 25th, 1921.

Dr. McCollum operated, in accord with the technique above described, on January 3rd, 1918. Fig. 110 shows the conditions immediately after the operations. The radiographs indicate well the distance to which the paste of thymolized calcium phosphate and formocresol has been pressed. It is seen to extend slightly deeper in the larger distal canals, than in the smaller mesial canals.





Fig. 116. Same case; April 18th, 1922.



Fig. 117. Same case; May 25th, 1923.



Fig. 118. Same case; April 19th, 1924.

The actual stage of root-end development, and the radiolucent areas at the apices which indicate this condition, are more clearly seen in the radiographs shown in Fig. 111, taken February 16th of the same year, or about six weeks after the operation. These two latter radiographs are taken at more direct right angle to the buccal surfaces of the molars, and consequently the canals are more clearly delineated.



In the series of radiographs which make up the record of this case, those of the right side of the mouth are to the right hand of the reader, and those of the left side, to the left. Figs. 111 and 112, the latter taken in May, are too close together chronologically, to depict much change in root development; but the progress of the eruption of the bicuspid on the right side is well shown.

Dr. McCollum writes as follows: "I have a great many radiographs of this case, because we watched it very closely, fearing pulp death in one or other of the teeth, and wished to have immediate knowledge of any pathological changes that might be disclosed by the radiographs. But I am submitting only three sets of radiographs taken the first year, and one pair for each year subsequently."

It seems scarcely necessary to describe each set of radiographs separately. They speak for themselves, and will tell their own story to any one competent to interpret radiographs.

The fact of greatest importance to be noted is, that as the radiographs are studied, the apices of these two molars are seen to be gradually completed, and the width of the canals narrowed, until in Fig. 118, we find perfectly formed roots, in perfectly normal alveolar bone. The radiolucent areas at the apices have disappeared and we have splendid pictures of the periodental lamellae, in that uninterrupted continuity which Pollia tells us indicates a state of health.

Comparing the radiographs in Fig. 118, with those shown in Fig. 111, we must admit that it is proven that it is possible for amputated pulp tissue not only to retain vitality, but to continue to function, at least to the extent of not interfering with the continuous development of the root apices.

It may be worth while also to call attention to the gradual alteration of the structure of the alveolar process. Note the much larger cancellar spaces in Fig. 118 (especially on the right side) as compared with the same areas in the earlier radiographs. This is significant of a fact not always remembered; that the osseous tissues, like the soft tissues, are being constantly destroyed and replaced, through use.

## CHAPTER XIII.

### Prevention of Malocclusion.\*

A large proportion of malocclusion is due to neglect of the deciduous teeth, which results in their premature loss, and frequently, in the loss of the first molars. Loss of the latter in youth, allows the erupting second molar to tip mesially, causing serious malocclusion. (Fig. 119.)

When a deciduous molar cannot be restored to health and must be extracted, the space should be maintained by a skeleton bridge, or by some orthodontic appliance. Before the age of six, there is no way of holding the space caused by the extraction of a second deciduous molar, hence the great need of preserving them. (Figs. 120 and 121.)

Early loss of deciduous teeth results most frequently from bad food habits, or lack of mouth hygiene. However, in many children, who practice good mouth hygiene and who have no carious teeth, habits are acquired which malform the face and jaws, terminating in poor health and marred features, which cloud their entire lives. The main reason for having a very young child under the care of an observing dentist is to discover and correct these habits. Dr. Stallard says:

"The physicians have relegated the care of the mouth to dentists. In the majority of children, dentists are not consulted until the mouth is nearly fully formed. At this time the tooth structure and arrangement have been developed, and the dentist cannot prevent, but can only repair, or correct, that which is treatable, and remove that which is hopelessly diseased. How strange it seems that the growth of all the other organs of the body is supervised by interested guardians, while the mouth, perhaps the most vital facial organ, is left uncared for until nearly fully developed! Certainly, dentistry can never be regarded as a high class profession, unless it prevents loss of teeth and the development of malocclusion. Indeed, we cannot permanently remedy dental disorders unless we know what factors produce the disease or deformity."

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\*Much of the material in this chapter I owe to Dr. Harvey Stallard of San Diego.

### Injurious Habits of Infancy.

In infancy, before teeth erupt, habits producing malocclusion may begin. Perhaps the most common is some sucking habit, or bed habits connected with bottle feeding. Nature corrects the injury done by thumb, or finger sucking, the earliest of habits, if broken before the age of two, but

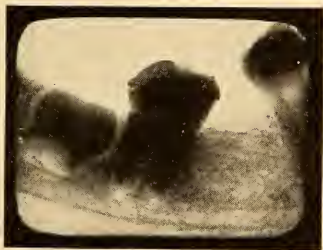


Fig. 119.

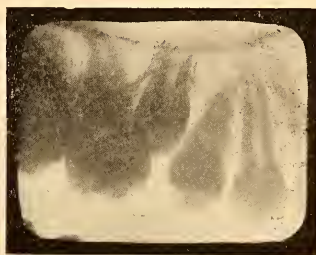


Fig. 120.



Fig. 121.

Fig. 119. Loss of space due to early extraction of the first permanent molar.

Fig. 120. Loss of space due to early extraction of the second deciduous molar.

Fig. 121. Model of a similar case.

if practiced longer, the habits are harder to break and the injury is greater and more permanent. Pressure from sucking hard objects may have several effects, the most common being the protrusion of the upper incisors, more apparent than real, because, while the maxillary incisors are being pushed labially the mandibular incisors are forced lingually to accommodate the finger or thumb. The pressure of the finger, or thumb against the hard palate, and external pressure, hinder downward and lateral development of the palate and narrow the arch.

**Preventing  
Thumb Sucking.**

In infancy such habits may be broken by binding the arms to the body—a practice followed by many primitive peoples where thumb sucking is unknown.



Fig. 122. Four views of the skull of a six year old Indian child, showing the good results of binding the arms.

(Figs. 122 and 123.) Older children may wear mittens at night or have the bed clothes pinned over their arms. Aluminum mits made for this purpose often bring good results. Drastic measures are sometimes



necessary and cuffs made of pasteboard, extending from the shoulder to the wrist and which will not permit the bending of the elbows, may be used at night and during the day. However, if a baby is not allowed to suck its thumb during the first six months, he is not apt to form the habit later.

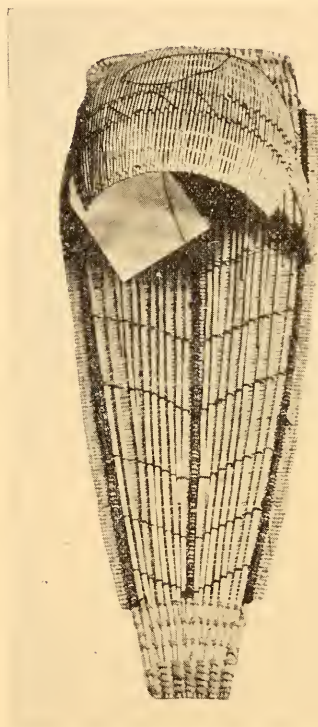
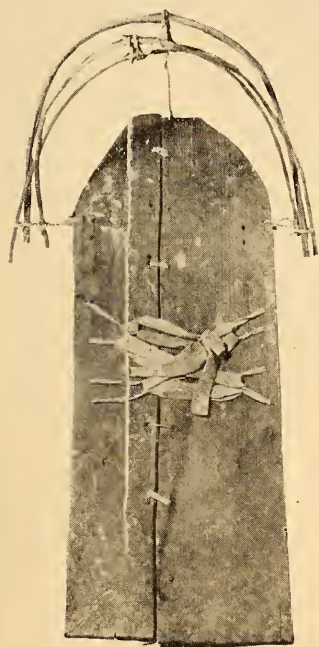


Fig. 123. Two forms of California Indian papoose baskets used for carrying bound infants.

A mother of a seven-year-old patient of mine invented a clever device which broke the child's thumb sucking habit in three nights. By winding around the thumb, adhesive tape, with the adhesive side out, on which were placed four or five pieces of match-wood, an inch or so long, parallel to the thumb, and then by winding over these another piece of tape, adhesive side in, she bound the matches to the first tape and attached the whole firmly to the thumb, so that the match pieces held the two bands of tape apart leaving air spaces, which, by preventing suction, removes the com-

fort of sucking. The device has the charm of cleanliness as it can be renewed whenever soiled.

**Lip Sucking.** Deforming lip sucking or biting habits (Fig. 124.) should be watched for and broken up at an early age. (Fig. 125.) Since most mothers have been educated to discard pacifiers, it is only occasionally that one sees infants having them.



Fig. 124. Malocclusion of the anterior teeth from biting the lower lip.

Bottle feeding, always attended with the danger of producing malocclusion in infants, should be watched and supervised to prevent other habits, as, lip or thumb sucking, or face pillowing. As soon as the child has had his meal, the bottle should be taken away, and, at as early an age as possible, cup feeding should replace the bottle. Many a child between the ages of one and three years is given a bedtime bottle, in order to induce sleep. This has two grave dangers. First; the labial surfaces of the teeth are endangered by food deposits; a danger greatly increased if the food contains much sugar and starch, so common in many patented foods. Second; bottle feeding continued after the second year, will almost always cause the malformation of the hard palate from the pressure of the tongue holding the nipple against the palate.

**Mouth Breathing.** Mouth breathing, frequently started by colds, enlarged tonsils, or adenoids, should be corrected promptly. Undernourishment, by lowering the child's resistance, makes him susceptible to colds, which some authorities attribute to a diet too rich in carbohydrates, particularly of refined white sugar, which satisfies the



Fig. 125-A.



Fig. 125-B.



Fig. 125-C.

Fig. 125. A. Profile of face of a lip-sucker. B. Profile of teeth. C. Anterior view of the teeth.

appetite but starves the tissues. After correcting the diet and caring for the adenoids and tonsils, physicians recommend simple calisthenics (to be practised with closed lips) which will promote nasal breathing. Court plaster put over the tightly closed lips at night, so frequently recommended by orthodontists who have special series of exercises to correct mouth breathing, may hold the mouth closed and compel nasal breathing.



Fig. 126. Lingual eruption of a permanent maxillary lateral incisor.

A soft diet requiring little mastication, possibly, is a cause for a lack of interproximal development in the anterior part of the dental arches, which may result in malocclusion, since the permanent teeth lack space for normal eruption. I am often asked to extract a lateral to make room for an erupting central incisor. If I were to do so, the permanent central incisor would fill the space to be occupied by both it and the lateral incisor, and when the latter came to erupt it would be forced labially or lingually. If a too wide space between the deciduous maxillary central incisors is held by an abnormal frenum, similar conditions may occur when the permanent central incisors erupt. Abnormal frenums, early loss of baby teeth and external pressure may cause maxillary lateral incisors to erupt lingually. (Fig. 126.) Very few lateral incisors erupt labially to normal, as do many of the permanent cuspids. Simple lingual occlusion, of a maxillary lateral incisor, is one of the minor malocclusions that may be easily corrected at home if treatment is begun soon enough. As soon as a lateral incisor is discovered erupting in lingual occlusion, the child should be taught to bite an orange wood stick so as to force it into correct position. (Fig. 127.) The success or failure of the operation will depend entirely upon the determination of the child; fully half of the children try-



ing it succeed. (Fig. 128.) One reason many succeed is the desire to win the reward offered by the parent; many a boy has won a bicycle in two, or three weeks, by getting the tooth to occlude into labial position.

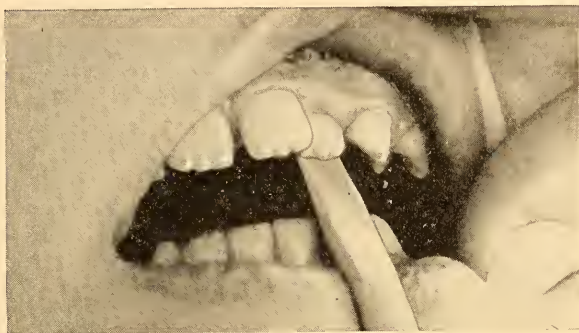


Fig. 127. Correcting the malocclusion by the leverage of an orange wood wedge.



Fig. 128. Both maxillary lateral incisors erupted in lingual occlusion and were corrected with an orange wood wedge.

### Cauterizing the Frenum.

The fold of mucous membrane, called the *frenum labii superioris*, attaching the upper lip to the membrane between the maxillary central incisors, is frequently overdeveloped, as can be seen by lifting the lip. The fold is often carried between the central incisors and attached to the rugæ of the palate. When the lip is stretched upward, the approximal tissues whiten, further indicating the intimate attachment. (Fig. 129.) The pressure of the frenum undoubtedly pushes the erupting permanent central incisors from the median line, causing early absorption of the root of the

deciduous lateral incisor and its premature loss. Cauterizing the band of tissue and drawing the central incisors together, often leaves space for the lateral incisors, which otherwise would erupt lingually.

The operation is very simple, causing very little pain. The heat of the



Fig. 129. An abnormal frenum pushing the permanent central incisors apart.



Fig. 130. The line indicates where the frenum should be cut.

cautery on the surrounding tissues induces the fear, if there is any. We know this, because when the frenum has been previously anesthetized, this same fear has often been shown; from which we have concluded that the natural fear of the unknown and the heat of the cautery cause *fear* instead of *pain*. To counteract the psychic factors, we cover the lips with a napkin, and have the child close his eyes while the nurse holds his hands. The operator lifts the lip, wipes the area to be touched with the cautery point

with phenol, and quickly severs the fold as shown in Fig. 130, being careful not to cut into the periosteum. This leaves a little open pocket when the lip is lifted. Pack this pocket with a pellet of cotton the size of a small pea, dipped in euroform paste. (Fig. 131.) Caution both the parent



Fig. 131 Cotton packed into the pocket resulting from the cut ligament to keep the ends from re-uniting when the lips are closed.

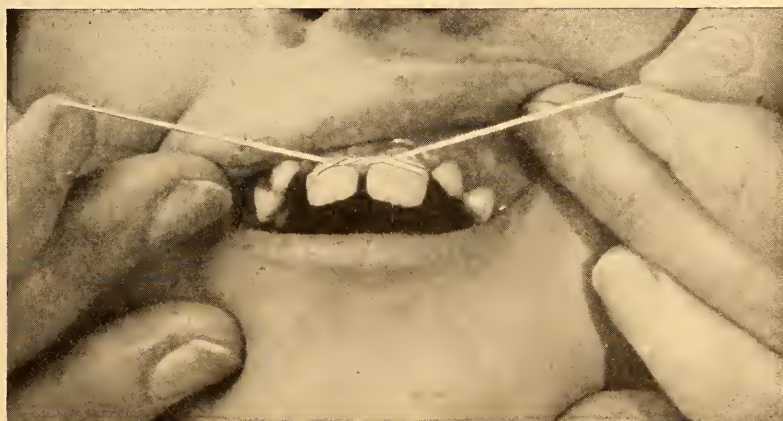


Fig. 132. Drawing the central incisors together with dental floss.

and the child to keep the cotton in place, because if lost, the closed lip presses the severed folds of the frenum together and they reunite. The central incisors are then tied together with dental floss. (Fig. 132.) At first the ligature is wound around the teeth three times, but as soon as the

teeth come together it should be passed around only once. Usually the teeth are in correct approximation within a few days, but the ligatures should be used to retain them for at least two or three weeks. Figs. 133, 134, 135 and 136 show cases after treatment.



Fig. 133. Boy, a twin, whose central incisors were widely separated with the right central incisors rotated. Photograph made two and one-half years after cauterizing the frenum and drawing teeth together. Right central incisor was given no other treatment.

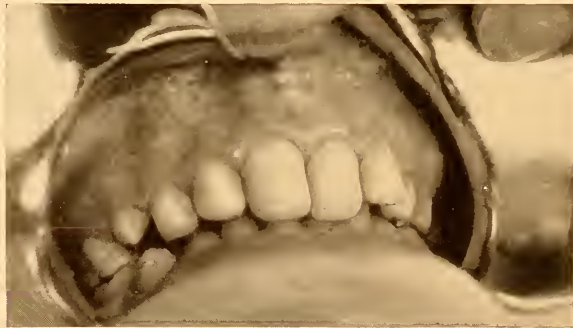


Fig. 134. Girl, his twin, two and one-half years after cauterizing.

**Precaution in  
Cauterizing the  
Frenum.**

1. Never undertake the operation unless the permanent molars are in normal occlusion. If they are in malocclusion the patient should be referred to an orthodontist.
2. Do not dissect out the ligaments—following them between the centrals to their lingual attachment, for there is danger of destroying the festoon of the tissue filling the gingival approximal space.
3. In tying the ligature be careful not to pinch the fold of membrane at the lingual of the median line (the cen-



tral ruga). It may be necessary to put a tiny dot of cement near the cutting edge of each incisor, so that the ligatures may be kept away from the gingival and nearer the incisal edges of the teeth. When the operation is undertaken at an earlier age, before the eruption of the permanent



Fig. 135. Another case four years after cauterizing the frenum.



Fig. 136. Another case seven and one-half years after cauterizing the frenum.

central incisors, it is not successful but must be repeated at a later age. Where an abnormal frenum is not found in some adult member of the family, the space will often close normally through the forces of eruption, and the mesial migration of the buccal teeth. Hence it is well to keep such cases under observation for a time before cauterizing.

#### **Simple Early Interference.**

Simple operations often prevent more serious malocclusion as shown in Fig. 137, models made from compound impressions when the child was 18 months old. Fig. 138 was made with plaster at two years of age. The supernumerary maxillary lateral incisor pushed the lower arch out of its

normal curve, causing a bulge in the region of the mandibular left lateral incisor and cuspid. If the supernumerary lateral incisor had been removed at the 18th month, the flexible little jaws, under the normal muscular forces of the tongue and lips, would probably have returned to normal.



Fig. 137.

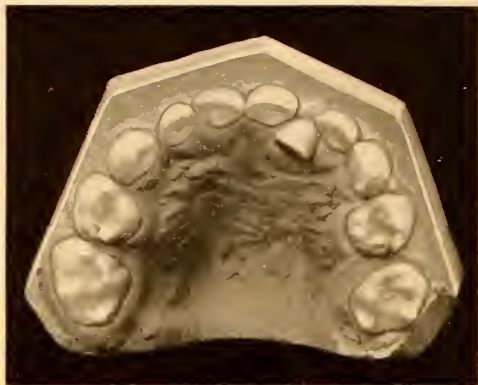


Fig. 138.

Fig. 137. Models from compound impression made at eighteen months, showing supernumerary maxillary lateral incisor causing the unsymmetrical development of the mandible.

Fig. 138. A plaster impression of the upper arch made at two years.

### Lancing.

Children's dentists are often asked to lance over erupting teeth; first, because they are delayed in eruption; and second, because the child is suffering pain. In the first instance the tooth may be held down by ligaments causing its deflection from its proper course. The simple operation of lancing may avert such trouble. Fig. 139 is the radiograph of such a delayed tooth. Fig. 140 is the photograph of the same case the day after lancing.

### Case History.

#### Lancing.

The history of an extreme case will illustrate the second reason for lancing. Ruth C., 15 months old, who suffered from nervous symptoms whenever a tooth was erupting, was sent by a physician to have the gums lanced. There were no external evidences of such a need—as redness or swelling. When she was presented to me, she had not slept, nor eaten much, for a week, and had a habit of muscular contraction, drawing her knees up and becoming rigid. The first deciduous molars showed very little indication of eruption, but at the urge of the parents I made the incisions over both first lower deciduous molars. The teeth were so deeply imbedded in the

tissues that four days later they were again incised. The family reported that Ruth had immediate relief from the first operation, but that the muscular contraction and sleeplessness had again begun to give trouble. Being deeply imbedded, the teeth did not emerge. The tissue closing over them had to be removed with trichloroacetic acid.

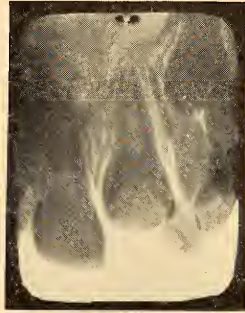


Fig. 139. Radiograph showing the delayed eruption of a central incisor.



Fig. 140. The same tooth the day after lancing.

Ruth was brought to the office nine weeks later, suffering in the same manner with the upper first molars. As they appeared to be deeply embedded, I lanced in a different manner, hoping to prevent the formation of bands of cicatricial tissue over the tooth. I made a mesio-distal cut with a lancet, in the buccal surface of the gum, from cusp to cusp, and then made a parallel incision on the lingual, cutting to the tooth. Insert-

ing a blade of curved scissors under the band, I severed it at the mesial end, then cut it away at the distal end, leaving a square opening over the tooth. This proved so satisfactory that I always lance in that manner now. (Illustrated in Fig. 141.) Ruth returned two months later suffering with the cuspids. After the lancing, there was relief from the nervous symptoms. She was under observation whenever she was in Los Angeles during two years, when they returned east.



Fig. 141. Model showing the method of lancing. The parallel lines indicate incision made with lancet, dotted lines to be cut with curved scissors.

### Pillow Habits.

According to the latest discoveries, another very important factor in the production of malocclusion is pillowing. It is commonly supposed that children go to bed and lie in all sorts of positions, never keeping the same position for any length of time, or never repeating the same position twice in succession. It has been known for many years, that if a child lies continually on his back, he will flatten the back of his head; or, if he is not turned continually in infancy, the cranium will be unevenly contoured. Physicians always caution young mothers to turn their babies frequently. However, to prevent children from having colic, they are often put on their stomachs, and taught to lie more or less continually, on their faces. Sometimes they pillow first on one side, then on the other. If their faces rest on the mattress, they will be flattened and the dental arches narrowed, with consequent narrowness of the nose—sometimes of the orbit. If a child rests its face more on one side than the other, the face will develop asymmetrically, the dental arches being narrowest on the down side.



the nose and lips slanting toward the up side. All children who pillow habitually on their faces in infancy, have narrowed dental arches, which cause bunching of all the incisors in the permanent denture.

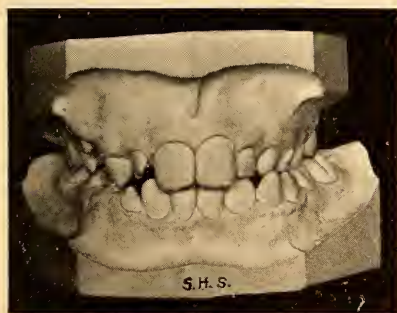


142A.



142B.

Fig. 142. A. Child pillowed occasionally upon the hand as illustrated. Both arches were affected, all of her permanent incisors erupted rotated.  
B. Models of same case. (From Stallard)



143A.



143B.

Fig. 143. A. Crossbite produced by pillowing on hand with pillow between.  
B. and C. Saddle-shaped arch produced by child resting cheeks on the forearm. Habit bilateral. Cast and photographs loaned by Dr. Harvey Stallard.

Pillowling has been neglected by the dentist, yet it is one of the most important factors in producing malocclusion.

Face pillowling is often practiced with some form of hand or arm pillowling, in which a part of the upper extremity presses on either the maxilla or the mandible. (Fig. 142 A and B.) There are many cases where



143C.

143C. Resting cheeks on forearms, producing saddle-shaped arch. See Fig. 143B.



Fig. 144A. V-shaped arch in a face-pillower who is also a mouthbreather; uses two pillows with the forearms underneath the bottom one. (From Stallard)

pillowing the maxilla on a hand, arm or pillow narrows the upper arch on one side producing a crossbite. (Fig. 143A.) If such a habit is bilateral a "saddle-shaped arch" (Fig. 143 B and C.), or a Gothic arch, or a



144B.



144C.

Fig. 144B and C. V-shaped arch of face-pillower and mouthbreather. See Fig. 144A.



Fig. 145. False prognathism in a child who pillows the maxilla on the hand and pillow. (From Stallard)

V-shaped arch (Fig. 144 B.) is produced, depending upon the nature of the habit. The beginning of the habit, and the consequent malocclusion, often start at the age of three or four so that the children's dentist can detect it by examining the occlusion. By discovering such a habit at that age, very serious deformities may be prevented. The denture will probably not return to the normal shape, but it will not grow much worse. In

fact, many times the pillow habit can be detected before the upper second deciduous molars are fully erupted. If a hand or arm is pressed against the upper incisors, in face pillowing, the maxillæ are repressed and false



Fig. 146. False prognathism in a patient who had a badly misshapened occiput, from difficult birth, and who was put on his face to avoid further malformation of the cranium. (Photograph loaned by Dr. Harvey Stallard)



Fig. 147A. Asymmetrical distal occlusion, with mandibular lingual occlusion on the right side, in a child who pillowed on the hand. (Photograph loaned by Dr. Harvey Stallard)

mandibular prognathism is produced. (Fig. 145.) Similar deformities may be produced by pillowing on rolled pillows, but in such cases the line of demarcation between the abnormal and the normal occlusion is not so





Fig. 147 B. Casts showing results of pillowing as pictured in Fig. 147A.

distinct, the change from the normal to the abnormal being very gradual. (Fig. 146.)

The influence of pillow habits on the mandible, laterally, is not so marked and evident as upon the maxillæ, because the mandible is movable,



Fig. 148. Child who was compelled to lie continuously on the left side due to a mastoiditis on the right. Fist was held so that the thumb and the forefinger pushed forward on the left angle of the mandible. (After Stallard)  
A. Pillowing position. B. Models of the case.

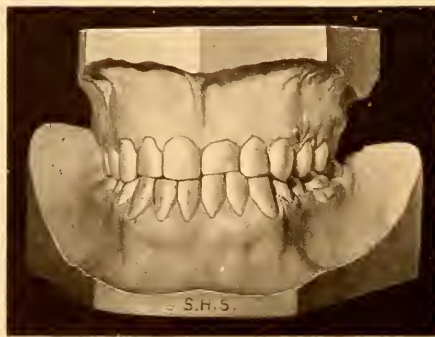


Fig. 149. Cast of a subject who pillowed similarly, the habit being bilateral. (Photograph loaned by Dr. Harvey Stallard)

and many times escapes the pressure. However, in a very small percentage of cases, the mandible is narrowed on one side, so that the mandibular buccal teeth are in complete lingual occlusion. This condition usually begins in the mixed stage of the denture and continues to grow worse as the mouth develops. It is produced by the child pillowing the mandibular

buccal teeth and alveolar process on the forearm, fist, bottle or hand. The habit is rarely bilateral. Fig. 147 represents a mild form which shows lingual occlusion of the mandibular buccal teeth on the right side, with an inlocked lower right lateral incisor. This child narrowed the right side of her mandibular arch and shortened the left side.

Another very serious kind of pillowing the mandible upon the hand is that in which the fist is tucked in the infra-auricular fossa so that continuous pressure is exerted against the angle of the mandible, which crowds the jaw forward. If the habit is unilateral the mandible will be shoved forward on one side only. (Fig. 148 A and B.) If the habit is bilateral true mandibular prognathism is produced. (Fig. 149.) Though this habit usually begins in the mixed denture, it has been found to have started in several patients after the fifteenth year, producing marked malocclusions.

All of these forms have been associated with mouth breathing, because, in these strange night postures the drainage of the nose is interfered with, and the way of least resistance is mouth breathing. Mouth breathing has, hitherto, been regarded as an active factor in the production of malocclusion. Stallard denies this, claiming that it is only an important passive factor, which he illustrates by saying that it is easier to mash a baking-powder can when the lid is off. When the mouth is held open, and the jaws pillowed upon, they are repressed, or narrowed, more easily than when the mouth is closed. It is necessary for the dentist to detect the effect of mouth breathing upon the denture and to prescribe methods for overcoming this insufficient and perverted method of respiration. Correction of respiration, of diet, and of masticatory habits, will not prevent much malocclusion, unless the pillow habits are corrected also.

Pillow habits may push lingually any one of the upper teeth, except the third molars, before they erupt, before the inclined planes can function; and, hence no matter how hard the food, nor how good the diet, the erupting teeth can be pushed inward. In those children who use their deciduous molars, most of the cusps are often worn off and, in these children, the upper teeth are easily forced lingually since the worn cusps do not interlock and brace the jaws against the pressure of a pillow habit. The majority of crossbites are in the mouths of abnormal breathers and eaters. But the face, or hand pillower, who breathes normally, will have overlapping of the upper teeth and close bites; i.e., the upper incisors overhang greatly the lower, so that they strike the labial gingiva of the lower incisors and the incisal edges of the mandibular incisors cut into the mucosa behind the upper incisors. Many cases of impacted cuspids and incisors are the result of hand and face pillowing.





Fig. 150. A child who was a face pillower from infancy. Note the beautiful cranium and forehead. Bilateral distal occlusion with lingual occlusion of the upper left maxillary buccal teeth. (Photographs loaned by Dr. Harvey Stallard)



We are certain that pillow habits are factors in a very large percentage of those forms of malocclusion, in which the mandible is in distal position, but at present we are not certain whether the distal position of the jaw is entirely due to the child's pillowing in such a manner, as to keep the jaw from developing forward. It seems entirely possible to one viewing the proposition from the theoretical viewpoint. If the mandible

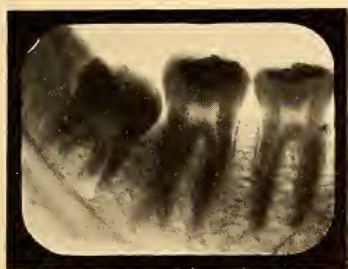


Fig. 151. Crowding of the incisors attributed to pressure of the erupting third molars.

may be carried forward by a pillow habit; if the maxillæ may be repressed and held in a posterior position, or carried to one side; or if the mandible may be narrowed on one or both sides by a pillow habit, there is a great likelihood of the mandible being held distally, by pillowing on the face with the mouth open, so that the forward development of the jaw is inhibited. (Fig. 150.) In cases of this form of malocclusion the upper arch is narrowed. It has been thought formerly, that the narrowness was due to the upper arch being molded over the anterior part of the lower arch; also to the drawn muscles of the lips of a constant mouth breather. The former factor is real, but the later never materializes. The narrowness of the upper arch in all the forms of distal occlusion, is due to the face pillowing. The most *opportune* time for pillow habits to do the most damage is in infancy, before the deciduous teeth erupt. As the habit grows, it increases in effectiveness and persistency. When the deciduous molars are being replaced by the bicuspid, the habit reaches a post-climax in the damage done. At the age of 14, pillow-habits have done their greatest amount of harm, and it is at this age that the average dentist would have children presented for treatment.

In observing children, if the permanent incisors begin to overlap at any time after the **eleventh year**, have the region of the third molar radiographed to determine whether undue pressure of impacted or partly impacted third

**Possible Influence  
of Third Molars.**

molars may be the cause. (Fig. 151.) Dr. Stallard disagrees with this idea and shows (Fig. 152) where the incisors are bunched, but where the

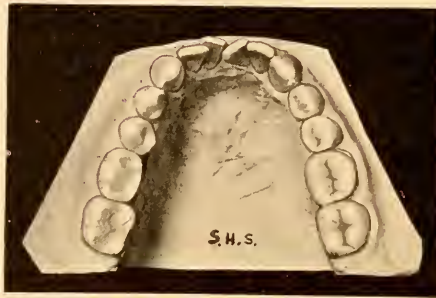


Fig. 152. Lower arch of a subject who has had no third molars yet has had rotated and bunched lower incisors.

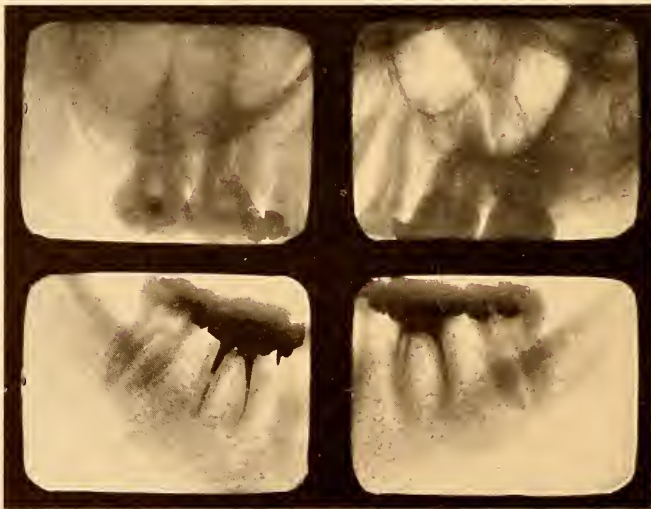


Fig. 153. Radiographs of same case. (Photographs of Fig. 152 and radiographs of Fig. 153 loaned by Dr. Harvey Stallard)

radiographs (Fig. 153) show no third molars. More extensive research will be necessary to determine this point.

Another cause of malocclusion, which is far more frequent, is that due to the absence of permanent teeth. Dr. Black states that the upper lateral incisors are most often missing. Lately orthodontists have thought that upper

**Congenital  
Absence of Teeth.**

second bicuspid are more often missing than upper lateral incisors. Lower second bicuspid, very rarely lower cuspid, are wanting occasionally. The radiograph at the age of six, or later, will detect the absence of these teeth, although a hint of their absence is given by the deciduous molars sinking into infra-occlusion. In such cases the deciduous tooth should be kept as long as possible, and, if practical, shaped to meet the requirements of occlusion. When the upper deciduous second molars have no successors, they may be shaped into the form of bicuspid by prosthetic measures. When upper permanent lateral incisors are absent, the deciduous cuspid may be preserved and made to function as lateral incisors. The space should be preserved, in case the deciduous tooth is lost, until a permanent restoration can be inserted.

From such a survey it must be apparent that the prevention of malocclusion, where prevention is possible, should be taught by the dentist who works for children, to the family physician, the nurses, teachers and most important of all, the mothers. Until we learn to *prevent* malocclusion we will never know how to correct it, and maintain its correction.

## CHAPTER XIV.

### Effect of Diet Upon Teeth.

So much has been written upon diet by physiological chemists, dieticians and specialists in medicine and dentistry, that I hesitate to go into the subject, but to ignore, in a book upon children's dentistry, a factor that has perhaps the greatest bearing upon the development, health and long life of the teeth, cannot be done with justice to the children; also, no dentist can work successfully for children without having at least a rudimentary understanding of the relation between diet and teeth.

Only elementary facts, and early experiences that forced them upon my notice, will be dwelt upon in this chapter.

#### Effects of Improper Diet.

Improper diet has more effect upon defective tooth development than any other one factor. This may be caused in two ways; first, the *mother*, upon a diet lacking in vitamins and minerals necessary for the proper development of the foetus, may bear an offspring with marked signs of calcium deficiency, resulting in malformed jaws and improperly developed teeth, with defective enamel. Second, if the *child* is congenitally weak or ill, or is incorrectly bottle-fed, or nursed by a weak mother, or one whose diet is deficient during the nursing period, the teeth will show the same lack of correct or normal development.

The basic fact is the affinity, in the body, of the acids for the alkalies. There is no danger of an excess of foods producing alkalies, with the present diet of the majority of people, but the excess of acid producing foods is an ever present danger. In the last fifty years, the consumption of sugar has increased 500% per person; flour has undergone further refinements, and the prepared breakfast food has become a fixture in most homes.

#### Diet During Pregnancy.

Unless wisely guided during pregnancy, the expectant mother, upon the ordinary diet of meat, potatoes, white bread, pie, cake and candy, with sweetened tea and coffee, is reducing her body to such an acid condition, that



both she and the fœtus are robbed of the minerals necessary for the development of the bony frame and teeth of the child. The acid in her body, seeking its alkaline affinity, breaks down her teeth and even weakens her own skeleton, according to the researches of Hesse and others. Where there is illness, or a food deficiency during this period, it frequently results in defective teeth for the child. This is much more common than is generally understood, but the improvement resulting from educational work during the last few years, undertaken by different health centers, is shown in examinations made of large groups of young children. As such work should be extended as much as possible, every dentist should consider it a part of his day's routine to enlighten his patients in regard to their responsibilities in *providing* and *preparing* not only the diet of the prospective mother, but also that of the children growing into future citizens.

With the increased mineral need of the pregnant woman, the diet must be largely confined to dark breads and vegetables, particularly the leafy variety, fruits, milk, butter and eggs.

Dr. Moore says:\* "The importance of minerals is often overlooked. If a diet is lacking in calcium, for instance, the reserve store in the body is called upon to meet the need. A diet may be deficient in iron, as is a milk diet, and a person so nourished necessarily becomes pale and anemic. Green vegetables are our best source of minerals, and contain them in adequate proportion in a form easily assimilated. Fresh vegetables, therefore, constitute an important requirement in a pregnant woman's dietary."

Particular attention must be paid to the preparation of the cooked vegetables, so that the valuable minerals are not drained away in the water in which they are cooked. Sugar must be strictly limited. The woman who drinks two or three cups of tea or coffee with each meal, and who takes two or three lumps of sugar with each cup, is injuring both herself and the developing child. The fifteen to twenty lumps of sugar will require so much alkaline to neutralize it, that not enough mineral will be left to build the teeth and skeleton, and such a mother will have her own teeth destroyed to satisfy the alkaline necessity.

This general diet should be followed through the nursing period, and also by the child through the years of childhood, as these are the periods in life, when the demands for minerals are greatly in excess of that of the adult.

**Proper Water  
Important.**

The need of more water of good quality, during these periods of growth, must be stressed. Distilled water is robbed of its minerals; hence its use is in-

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\*"Nutrition of Mother and Child"—C. Ulysses Moore, M. D.

jurious. Several times I have had children brought to my office who had been drinking distilled water from infancy, with teeth almost lacking in sound enamel and with very little resistance to caries. If the purity of the water supply is in doubt, the water can be boiled and cooled. Iced water, composed largely of melted ice, invites the same objection as distilled



Fig. 154. Hypoplasia of the permanent central incisors due to bottle-feeding.

water. Water drinking should be increased during pregnancy, not only for the minerals, but because it assists in the body regulation and elimination.

**Importance of Proper Hygiene.** Strict attention should be paid to all the rules of health, such as personal hygiene and mouth hygiene, exercise and sunshine and fresh air in the sleeping room. This was apparent from the beginning of my work with children. In a paper printed in the December, 1910, *Dental Gazette*\* I said: "We find that any serious interference with the health of the mother during pregnancy may result in a weakened resistance to caries, as well as a weaker structure of the deciduous teeth of the child, and I have on record three cases, where there was sufficient malnutrition to produce atrophy (hypoplasia) of the deciduous teeth. Sometimes this may be due to the suffering of the pregnant mother with her teeth, where some mistaken physician or dentist has advised her to leave them alone until after delivery. The foetal dental organs begin to form soon after the fourth month, and if the mother's mouth has been neglected, about this time nature begins to protest, and the mother to suffer with her teeth. If her night's rest is broken and her digestion is impaired, would it be hard to trace to this source, frail deciduous teeth?"

Hypoplastic teeth are the result of malnutrition and are more commonly found in the permanent set than in the deciduous, although I see many

\*"Mistakes We Are Making With Children"—M. Evangeline Jordon.

deciduous teeth very faulty in form and development. At the present time, many children are erupting permanent teeth, showing marked hypoplasia as the result of malnutrition during the last weeks of intro-uterine life or of the early years after birth. (Figs. 154-155).

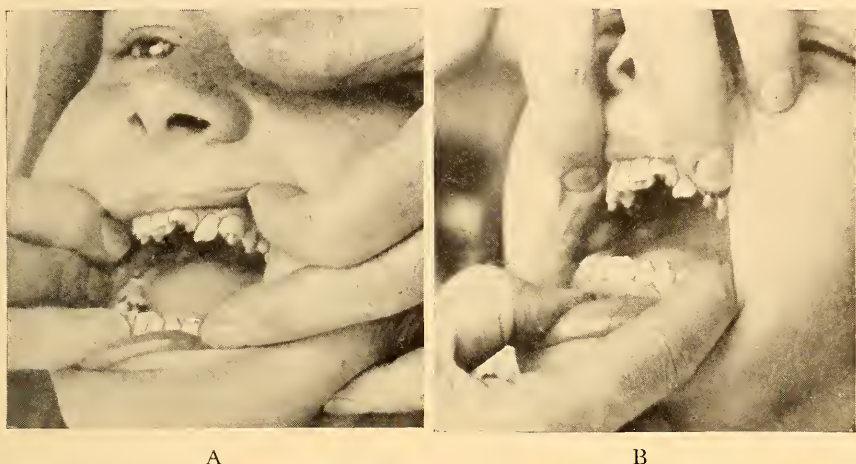


Fig. 155 A-B. Hypoplasia of the permanent teeth due to extreme malnutrition resulting from bottle-feeding and illness during the early years of life.

#### Proper Feeding for Children.

After birth, the first important question is "How shall the infant be fed?" With rare exceptions the *child should be nursed* during the first nine months of its life. Only in case of illness, or malnutrition of the mother, should the child be put upon the bottle. The nursing child has so many more advantages over the bottle fed child, that twice as many survive. The child who gets his nourishment from his mother, must work for it, and chewing develops strong muscles and well shaped jaws. The nursing child gets his food in a form prepared for his needs in the ideal manner, if his mother is healthy and follows a careful diet. The nursing child has an immunity to disease not shared by the bottle fed child, and is much less liable to develop rickets than bottle fed infants. (Fig. 156).

At the present time, it is claimed by some authorities that more than half the infants born, suffer from rickets between the second and twelfth months.

Dr. Moore says: \* "Breast feeding is the best means a mother can adopt to prevent the early development of rickets in her child."

\*"Nutrition of Mother and Child"—C. Ulysses Moore.



Fig. 156. Twins. The one on the left was breast-fed; the one on the right was bottle-fed on condensed milk. (*New York Health News*)



During the first year of life the growth of a person is much greater than during any other year of the lifetime; consequently, the materials for this growth must be supplied in sufficiency. The prepared food may not, and often does not, contain these materials in the proper proportion; hence the infant falls below the growth standard and lacks resistance to disease.

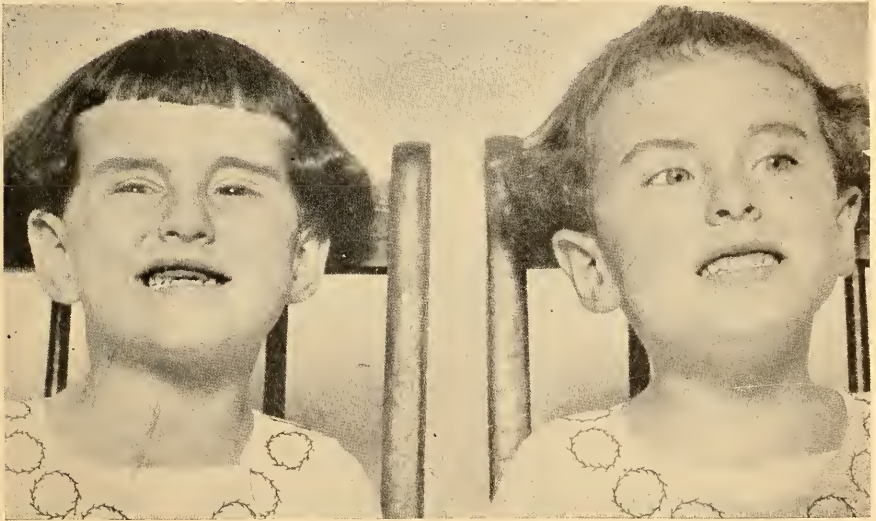


Fig. 157. "Twins three years of age reared in a cultured home. Their environment, care and feeding were similar except that the one with the good teeth was breast-fed for the first ten months while the other was bottle-fed."  
(From *"Nutrition of Mother and Child"*—C. Ulysses Moore)

If malnutrition is continued through the early years of life, it may result in hypoplasia of the permanent teeth as shown in Fig. 155. At the present time malformed teeth, ranging between Figs. 154 and 155, are all too common.

After the teeth begin to erupt, bottle-feeding has another menace. "Bottle-fed babies, fed on any of the highly sweetened prepared baby foods, may show an early breaking down of the little teeth. You may often see in the mouth of a four-year-old, almost perfect second deciduous molars that are in marked contrast to the broken and blackened stumps of the rest of the deciduous set. They erupted too late to be injured by the bottle food."\* (Fig. 157).

Bottle fed infants when older, particularly if they have been raised

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\**"Mistakes We Are Making With Children."*—M. Evangeline Jordon.

upon sweet, starchy, prepared foods, refuse to eat vegetables. Dr. Moore advocates the use of raw cabbage juice, to be alternated with orange juice, for the nursing infant, as early as the sixth month, and vegetable juice, or soup, at the seventh month. A tablespoonful of puree of vegetables, at the eighth month, is to be increased to four ounces by the twelfth month. He claims that children do not dislike vegetables, if they have been accustomed to them during the first year. This agrees with my studies of the diets of children who have come under my care. If the child in infancy has not had his palate trained to the flavor of vegetables, it is often difficult to persuade him to eat more than a favored few, which as a rule, do not include the leafy vegetables in sufficient quantities to maintain the mineral balance of the body.

Mother's milk is the perfect food for the early months as it contains the bone forming elements. For the growing child, cow's milk includes all the necessities for growth except iron, and one glassful should be drunk after each meal, unless an equivalent quantity has been part of the menu, in soup, custard, etc.

Dr. Seccombe says: \* "Mastication opens up the whole question of digestion."

The child, who has been breast fed, requires little education in mastication, but will gnaw a hard crust, or a bone, like a healthy little puppy. It requires infinite patience to educate many bottle-fed children to masticate their food, and many drag out an unhappy existence through life, harassed with indigestion and malnutrition, from never having learned to masticate.

It is for such children as these, that we have had to lay down the following rules in an effort (which is generally followed by improved oral conditions) to establish habits of mastication.

**Rules of Diet  
for a Child.**

"Drink a glass of water upon getting out of bed. Do not drink with the meals. No ice water is to be placed before the child. Give the child less mush, and more crisp dry toast, or home-made zwieback, with fruit, eggs or bacon, and finish the breakfast with a glass of milk. Let him drink plenty of water between meals, but do not piece out with cookies, etc. The other two meals should consist of raw and cooked vegetables, with some meat, or cheese (cottage), eaten with whole-wheat, or other hard bread. Desserts must be simple, and not too sweet or starchy."

A child who is properly developed, with strong, well shaped teeth, may

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\*Dr. Wallace Seccombe, Royal College of Dental Surgeons, Toronto, Canada.

have them *wrecked* through incorrect diet. Many such cases come to me, but three examples will be enough.

**A Case from  
Practice.**

Early in my practice I worked for a family of several children who had strong, well shaped teeth, in perfect occlusion. The surprising thing was, that after thoroughly cleaning the teeth of these children, with a sharp instrument, I could scrape off the enamel anywhere on a tooth. As two of the children had their first permanent molars in position, this condition of the enamel appeared to me to be very alarming. Inquiry disclosed the fact that both the morning and evening meals were of well sweetened mush *only*. The mother could not be convinced that such a diet was not best for her children, and, as it was before the days of popular food articles in magazines, I was unable to convince her that her course was unwise, so I gave the family up as hopeless.

**Case No. 2.**

The second case was a boy of three, being taken to his home in the east from the Philippines, where he had been born. His diet had consisted of mushes and paps, with the result that the enamel on the labial surfaces of all his teeth, was soft and pitted, and on some teeth entirely destroyed. In his case there was so much pain from the denuded surfaces, that silver nitrate had to be applied several times before they could be touched with a hard instrument.

**Case No. 3.**

The third case was a subnormal child of six, who was under my care until she was thirteen. At her first appointment, the teeth were in the same condition as those of the boy. She was on a soft, mushy diet. I told her mother that no lasting good would result from any work done, unless there was a radical change in her diet. Her physician called up in great vexation to tell me that everything possible was being done for the child, as she was almost without a pituitary body, and that she was improving on the diet he had prescribed. I firmly explained that I was not so much interested in *what* she ate as in the *form* in which she ate it. To make it clear I said that water was in three forms, ice, water and steam, and that I wanted her cereals to be given in the forms of crusts and toasts and not in the form of mush. He made that change in her diet, and I succeeded in building up a comfortable masticating surface. When I last saw the patient her teeth were somewhat irregular, but in perfect condition, with the exception of a few small fillings in her first permanent molars.

These and many other such cases occurred early in my practice before Sherman, Mendel, McCollum, Howe and others had published their experiments upon animals.

In childhood, candy and sugar eating are perhaps the greatest dietetic errors. "McCarrison in speaking of the freedom of uncivilized races from gastro-intestinal disturbances, among other things, says, of a tribe in the Himalaya Mountains,—'not so much sugar is imported into their country in a year as is used in a hotel of moderate size in a single day.' In refined sugar, some of the valuable elements are lost and children thrive better from the dental standpoint where they derive their sugar from raisins, figs, dates, prunes and other fruits."\* The California dates are particularly valuable, as they are packed without breaking the skins and are much cleaner than imported dates.

"In my practice I have found nothing that leaves the teeth more coated, and the peridental membranes softer and more hyperemic, than cocoa and chocolate drinking. Children with such habits are often more or less anemic. The chief danger is because the hot, stimulating, rich, sweetened drink, easily satisfies the appetite and not enough rough hard wholesome food is eaten to nourish the body."\* The same is true with regard to sugar and candy.

Hot drinks, and foods containing too much sugar, constitute a second danger by irritating the stomach and causing a thickening of the saliva. When this condition exists salivary stasis deprives the teeth of the protective flow of normal saliva and is classed by Dr. Seccombe as one of the causes of caries.

In 1910 I had on record a family with teeth rapidly disintegrating. Upon inquiry as to diet, "I learned that the children breakfasted on hot cakes and coffee and the other meals were made at odd times of white crackers and jelly" \*

While mastication should be taught at an early age the child should not be nagged. The psychological influence of a happy mealtime must not be overlooked. Ample time should be spent at the table, but this should also be a cheerful time. The child who is scolded or constantly corrected during a meal cannot be expected to digest his food with the same ease as the child who is cheerful and happy while eating.

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\*"*Feeding the Child from the Standpoint of a Dentist*"—M. Evangeline Jordon, A. D. A., July, 1922.

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## CHAPTER XV.

### An Office Equipped for Children.

In gathering material for this chapter I decided to quote from an article "Kindergarten Dentistry"\* published in February, 1912, as it embodies the thoughts which have not changed in the years that have passed.

"As the wise man looks ahead and prepares for the future, so must we consider what makes for success, and then strive to achieve that success.

"Many, many years ago a wise old German, named Frobel, worked out a plan for the education of little children which today is used in all civilized countries under the name which he gave it, 'The Kindergarten' (children's garden), and its methods are being successfully applied in other lines of education. In the teaching of music, kindergarten methods have produced splendid results.

"My experience is that as far as possible dentistry for children should follow this same method; and just as the beginning of education for children, in special surroundings and by people specially educated for that line of work, is more successful in its results, so dentistry for children, should have special surroundings and operators specially fitted for this line of work; and just as men have seldom gone into kindergarten work, so very few of them will be as successful in this field, because very *young children* are used to being cared for by women, and have no fear to overcome with regard to the person of the operator.

"Children's dentistry, in a larger measure than adult dentistry, means something besides the mechanical plugging of holes. It means looking ahead, preparing for the future; and as the teeth are only one part of the body the work cannot be limited to the small circle of the orbicularis oris.

"The kindergarten dentist must be able to help the parent trace to its source the cause of the premature breaking down of the teeth. He must help, month by month, to correct faulty habits of diet, or of oral hygiene. In other words, he is not the mechanic but the wisely advising family

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\*"Kindergarten Dentistry"—M. Evangeline Jordon—*Dental Digest*, February, 1912.

friend. All his work points to a future set of permanent teeth, absolutely *perfect* and *permanent* for the entire lifetime, and this high aim must be firmly planted in the mind of the child as well as in the mind of the parent. Otherwise his work will fail, because soon the home routine will blunt the effects of his teachings.

"With the present generation of artificially fed infants, the children's dentist must be prepared to handle children at any time after the first birthday is passed. The day will come, and soon, when any dentist will be dropped from the roll of ethical practitioners who says to the mother, suffering in sympathy with the suffering infant in her arms, 'The baby is too young, nothing can be done.'

"If the dentist is not fitted to cope with the situation let him be in touch with some one who is. *I tell you that no child is too young for dental care*, and the reputable physician has very little respect for a so-called professional man who cannot meet and solve the problems in his own chosen field."

I wrote this over twelve years ago but I believe today and many members of the dental profession will agree with me, that the medical profession are not doing their share in grasping the opportunity to consider and guard the dental health of the child from birth. They are in attendance during the years of greatest growth and development before the average dentist is privileged to examine the child's mouth.

"These men who say that nothing can be done, have no idea of the great response nature makes to every tiny bit of work that it done. Sometimes the life of the child hinges upon such a trifling thing as whether the little teeth have been painted with nitrate of silver, so that they do not send a sharp sensation of pain to the sensitive brain centers, every time anything touches them. Or perhaps one of the upper central incisors has an abscess continually discharging pus which poisons the blood. If the child inherits a weakened constitution, either of these may be just enough to tip the balance toward death.

Assuming then that you must be prepared for all conditions that arise the next consideration is environment.

Just as the room for the nursery, or kindergarten is selected because it has sunshine and fresh air, so in selecting a dental office for children, the first requisite is light and air. Wherever possible, the reception room should also have sunshine and it is essential that the reception room and operating room should have between them a thick wall, deadened to sound.

My reception room is furnished as far as possible with the work of the American Indians. The floor, couch and pillows are covered with Navajo

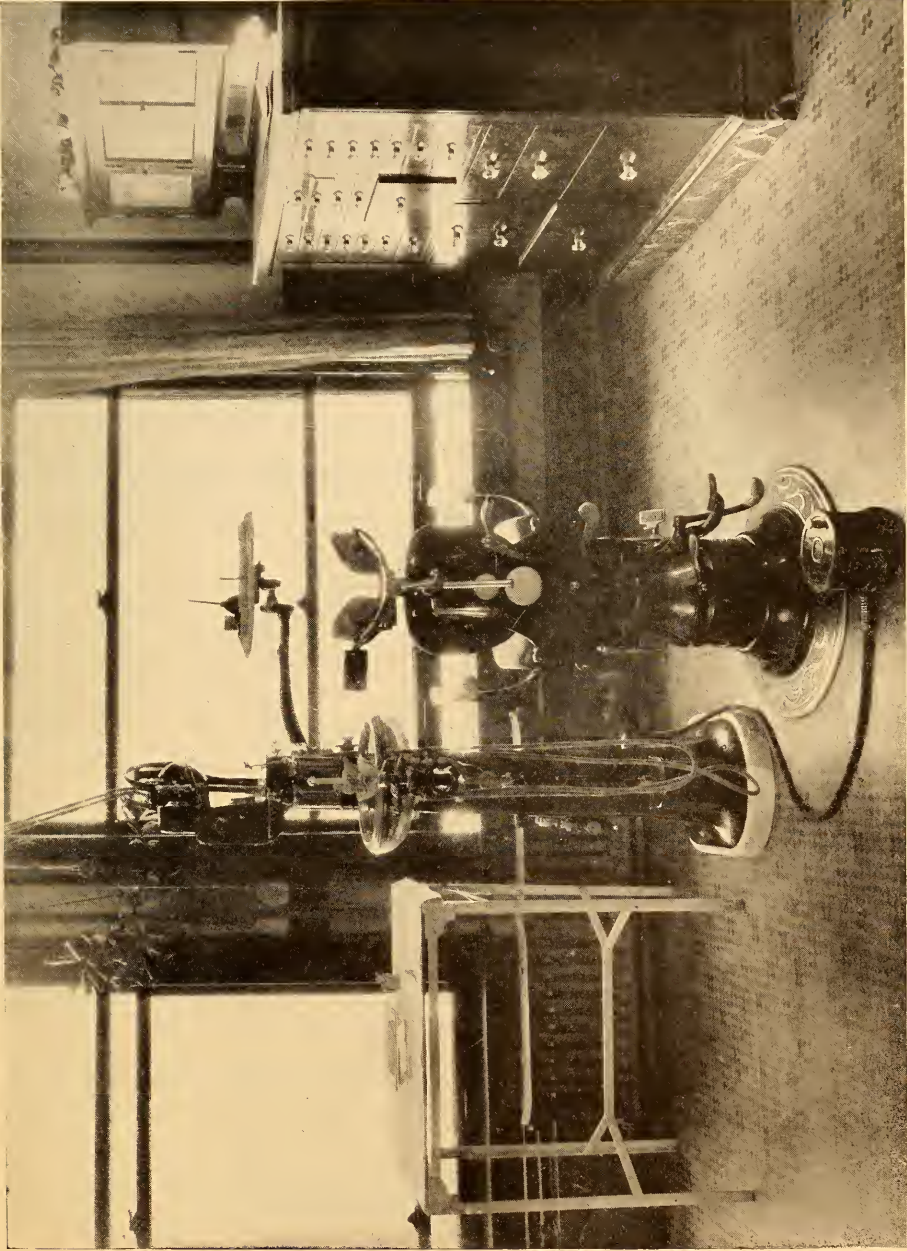


Fig. 158. The equipment in one of the operating rooms of my Los Angeles Office.



rugs, and the walls are hung with baskets and weapons of their primitive warfare.

The baskets for carrying the papoose, or food, or grain, and the snow-shoes, bows and arrows, war clubs and shields, all of these furnish new and delightful stories for the restless imagination of the child.

There are many other distinctive plans that could be followed. A reception room could be fitted in Dutch style where pictures, or wall paper, with windmills and Dutch children with their burdens, odd costumes and wooden shoes, could figure in wall decorations. Such an office might have a Dutch fireplace, with old tiles and brass bellows. An old cradle in miniature, and a pair of tiny wooden shoes, would bring to mind stories like Hans Brinker and His Silver Skates. In such an office Hans Brinker and other Dutch story books should be found upon the table.

It is easy to fit a reception room so that one's thoughts are directed toward China or Japan. In all of these rooms the toys of the children of the country copied should be part of the furnishings.

No matter what the style of room, select furniture that is simple and strong and floors that can be kept bright and clean.

Mission furniture harmonizes with Indian blankets and the small chairs that Gustav Stickley used to make are very durable. Children are so fond of them that often some spoiled child wishes to take home one of the little rocking chairs.

With Chinese or Japanese furnishings two or three low teakwood benches prove very attractive to children and a large one will make a very suitable table upon which to build blocks.

Children seldom lose their interest playing with celluloid animals\* or building blocks, and puzzle games are valuable in tiding over a period of waiting. Magazines that interest children are a necessary part of the equipment. For this purpose the best three are two monthlies, *Nature Magazine* and *The National Geographic Magazine*, and the weekly *Youth's Companion*. A few books of stories a mother can read younger children such as *Aesop's Fables* and *Mother Goose* should be added.

The operating room of a children's dentist should contain the best equipment obtainable with everything at hand as speed is often essential, the child becoming impatient and restless if there is any unnecessary delay.

The S. S. White children's chair equipped with white porcelain arms and knobs is clean and attractive. The porcelain head rest which is often seen upon these little chairs will not do as it is too hard for the tender little

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\*See Figs. 1-4, Chapter 1.



heads to rest upon. The best head rest is the padded leather one with gauze coverings as shown in Fig. 158.

The cuspidor should be equipped with the Clark water syringe as in most work for little children cold water is an advantage.

Aside from these points there is little difference in the equipment of an office for children, from that of a modern office for general practice, except that less space is necessary for laboratory work.

In Fig. 158 the sterilizer does not show, but the best type of electric sterilizer is necessary, as well as all other safeguards in preventing infection in the child's mouth.

Wherever possible, sash curtains should not be used, but the windows in Fig. 158 had soon to be curtained, because a new building opposite has been built. In selecting a location for a children's office try to choose one with windows facing a park or open space where curtains are not necessary, as good light is very important in working in the small mouths.

## CHAPTER XVI.

### Stories to be Told Children During Dental Operations.

Stories and verse are very useful in holding the attention of the child while sealing in a treatment, or putting in a filling.

The most successful story I ever tried, for children under five, is the story of the Little Red Hen, as adapted to California.

#### A Little Red Hen.

A Little Red Hen was out in the yard picking up corn. After she had eaten all she wanted she said, "Who'll plant this corn?" "I won't," said the Rat. "I won't," said the Cat. "Then I will," said the Little Red Hen, and so she did.

After awhile the ground was dry and the Little Red Hen said, "Who'll irrigate the corn?" "I won't," said the Rat. "I won't," said the Cat. "Then I will," said the Little Red Hen, and so she did.

The corn grew and grew and the weeds grew, too, so the Little Red Hen said: "Who'll weed the corn?" "I won't," said the Rat. "I won't," said the Cat. "Then I will," said the Little Red Hen, and so she did.

After a while the corn was ripe and the Little Red Hen said, "Who'll pick the corn and take it to the mill?" "I won't," said the Rat. "I won't," said the Cat. "Then I will," said the Little Red Hen, and so she did, and brought back a sack of cornmeal.

Then she said, "Who'll make a cake?" "I won't," said the Rat. "I won't," said the Cat. "Then I will," said the Little Red Hen, and so she did.

And she put raisins in it, and put nice frosting on the outside, and on the top she put in red candies "For a Little Red Hen," and she said, "Who'll eat the cake?" And the Rat said, "I will," and the Cat said, "I will." "Oh, no, you won't; I will," said the Little Red Hen, and so she did.

After the child has passed the age of five, stories in rhyme are most valuable, and I owe much of my success with children to the fact that during my college days I memorized a number of Dr. Smith's Funnyland stories.

When ready to put in a filling, I tell the child that if he will sit still I'll tell him a story. If he has not been very brave I say, "You'll have to be a little soldier. Let me tell you about them."

---

### The Soldiers of Funnyland.

Oh, the soldiers are never afraid  
To march in a long cavalcade,  
To his Majesty's park,  
To shoot at a mark,  
Or take part in a deadly parade;  
A boom-ta-rahing parade.  
When the band blows a blare  
To crack open the air,  
Oh, the soldiers are never afraid.  
For years, through the King's oversight,  
They had never been called out to fight;  
And they thirsted for gore,  
(Other people's) and swore  
That they languished to fight for the right.

One day the King chanced to spy  
A ship sailing by in the sky;  
And, I grieve to relate,  
Made a face at the Mate,  
And the Mate was insulted thereby;  
In fact, "he had blood in his eye."  
So he signalled the Chief Engineer,  
To check the ship's raging career,  
And the anchor dropped down,  
And caught in the Town,  
While the children all trembled with fear,  
A lovely, blood-curdling fear.  
Then the best parachute was prepared,  
And the Mate, while the people all stared,  
Came zigzagging down,  
In the midst of the town;  
But the King didn't look a bit scared.  
(Though I think that he would if he dared).

The face of the furious Mate  
Was covered with whiskers and hate;

"The people," said he,  
"Who make faces at me  
All meet with a horrible fate—  
A midnighty, church-yardy fate.  
Surrender your Funnyland isle!  
Surrender your treasury pile.  
Surrender to me!  
But the King said, said he:  
"Excuse me, dear Sir, if I smile!"  
(Oh, his smile could be seen for a mile!)

When the speaking and smiling were done,  
The army came up at a run.  
Oh, the Mate was alarmed,  
For each soldier was armed  
With a kind of sky rockety gun.  
They drew up in battle array,  
All loaded and primed for the fray.  
Oh, the racket was dire,  
At the order to fire,  
And the Mate—why, he fainted away  
('Twas the one way of getting away.)  
Then there came a most terrible crash,  
Such as big things make going to smash;  
For the ship struck the ground,  
And the air all around,  
Was filled up with splinters and trash,  
Dust, kindling-wood, oakum and hash.  
(The captain and crew were the hash.)

The Mate knew his chances were slim  
But he never suspected how grim  
Was his oncoming fate.  
He was destined to wait  
On the King who'd made faces at him—  
Disrespectful, wry faces at him!

If you ever should sail in the air  
As Mate of a ship, O, beware!  
If the King in full view  
Should make faces at you,  
Don't suffer your anger to flare—  
Remember this tragic affair!

---

### Babies in Funnyland.

There's an island 'way off in the seas  
Where the babies all grow upon trees.



It's the jolliest fun,  
To swing in the sun;  
But they have to look out how they sneeze,  
O' I tell you they'd better not sneeze!  
They might break themselves off,  
With a sneeze or a cough,  
And tumble down flop on their knees.

When the clouds darken mountain and dale  
When the breeze freshens up to a gale,  
There is screaming and dropping  
And laughing and hopping;—  
In fact little babies just hail.  
They all lie on the ground in a pile,  
And when people come, after a while,  
They quickly pass by  
The babies that cry,  
And they pick up the babies that smile;—  
O, they even take twins if they smile!

A wonderful Funnyland sight  
Is a mountain of very great height;  
But you never could guess  
What happens, unless  
You should be there on Saturday night.

When the sun in the west is aglow  
The whole mountain rumbles, and lo,  
It pours out a stream  
Of assorted ice cream  
By the banks where the macaroons grow.  
Then from city and country and town,  
The children, of king and of clown,  
All run with their spoons,  
And they pick macaroons,  
And they eat till they have to lie down.

But the thing that the children adore,  
Is a mountain that stands by the shore,  
With a cratery pot,  
Where molasses keeps hot,  
With trickles of taffy galore.  
Sometimes it rains pop-corn at night;  
And all of the kernals that light  
On the mountain-top, pop,  
And they hop, and they drop,  
Till the top of the mountain is white;  
And the corn balls roll down  
To the edge of the town,  
While the children dance 'round with delight.

There's a spring hidden deep in a glade,  
Of most excellent pink lemonade.  
It falls in a pool,  
All bubbly cool,  
From a babbling and brawling cascade ;  
And the children, each summery day  
When they're thirsty with rollicking play,  
Go there and dip up,  
Lemonade in a cup,  
And drink till their buttons give 'way.

---

### Christmas in Funnyland.

The Funnyland chimneys are all  
So large and exceedingly tall,  
That Santa Claus shook  
In his shoes when he took  
A look at the distance to fall ;  
Then he altered his plan,  
Like a wise little man,  
And didn't climb chimneys at all.

But in dooryards of every degree  
He planted a curious tree ;  
And now every year,  
When Christmas is near  
The fruit is a wonder to see.  
There are dollies and trolleys and rows,  
Of silky and satiny clothes ;  
And candles and strings  
Of tinsel, and rings  
For the fingers, and bells for the toes.

There are serpents and sugary hearts ;  
Tin soldiers and cinnamon tarts ;  
While bicycles grow,  
On the branches below,  
With wagons and wabbly carts.  
There are ducks that you squeeze and they squawk ;  
And green polly-parrots that talk ;  
And filberts and figs,  
And cottony pigs  
That you pull by a string, and they walk.  
On Christmas Eve children go out,  
To the Santa Claus tree with a shout,  
And put baskets below the things that they know  
That they couldn't be happy without.

Then Santa Claus comes in the night  
When there isn't a person in sight;  
And he chuckles with glee,  
As he climbs every tree,  
And shakes it with all of his might.  
Things rustle and rattle and flop,  
And loosen and tumble and drop,  
Till the children awake  
With the noise that they make  
And the baskets are full to the top.

Just think of the wide open eyes,  
Of children awaiting surprise!  
They tumble and twist,  
And sit up and insist,  
That the sun has forgotten to rise.  
Then all, when the windows grow gray,  
Run out in their bedtime array,  
And the frolic begins;—  
They would like to be twins,  
To double the joy of the day.

---

### Fairies in Funnyland.

When slanting moonbeams touch the hills,  
And shadows fill the glen;  
When people all are fast asleep,  
The little maids and men  
From Fairyland come sliding down  
The moonbeams in a row,  
With tuneful laugh and merry jest  
And faces all aglow;  
As children in the winter lands  
Toboggan on the snow.  
The moonlight gleams on gauzy wings,  
And glints from precious stones;  
And caps are crowned with little bells  
With silvery tinkling tones.  
Each fairy wears a cob-web dress,  
And through his filmy guise,  
The mischief shows in every move,  
And sparkles in their eyes.

And some with bags of happy dreams,  
Go softly stealing where  
The island children lie asleep,  
And while they're unaware  
Untie the bags, and lo, the doors

Of wonderland stand wide!  
I hope, my child, you've been sometimes  
Where dream-bags were untied.  
The crooked gnomes, with peaked hats  
And faces ill to see,  
Come swiftly riding night-mares too,  
And with an elfish glee  
They gallop over children who  
Ate fruitcake after tea.  
I hope, my child, you do not know  
About the things they see.

One fairy stole a pepper box  
And flew above the bay,  
And scattered clouds of pepper where  
The sleeping Tiboons lay.  
The Tiboons sneezed, the islands shook,  
And chimneys tumbled down.  
The people thought a foe had come  
To cannonade the town.  
The King got up and tumbled so  
He joggled off his crown.  
My child, if Tiboons chance to live  
In any neighboring bay,  
You'd better lock the pepper up  
Whenever you're away.

One night with fairy mandolins  
They played such 'witching strains,  
A kind of dancing madness ran  
Through every hearer's veins;  
The players passed the Palace Gate;  
The King and Queen and all  
The people of the household came  
A-dancing through the hall.  
They hadn't time to don their dress,  
Who heard the music's call.  
They danced the streets, and all who heard  
The music lilt along,  
Came tripping lightly at the sound  
To join the merry throng;  
Till all the people in the isle,  
In sleeping clothes arrayed,  
Were dancing in the moonlight night  
In motely masquerade.  
They danced and whirled beside the bay  
Where Tiboons by the score,  
Who'd heard the merry mandolins,



Were skipping on the shore.  
One Tiboon gave his flipper to  
His Majesty the King,  
And there together on the sand  
They "cut a pigeon-wing."  
The Fairies laughed until they cried,  
'Twas such a funny thing!

At dawn the fairies flew away;  
The dancing stopped—ah me!  
The weariness and burning shame  
Were very sad to see.  
A sort of Sunday quiet filled  
The isle from shore to shore;  
But Fairyland resounded with  
A most hilarious roar.  
My child, when slanting moonbeams fall  
Around your house, beware,  
Lest Fairies with their mandolins  
Should catch you unaware.

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Other poems by Albert W. Smith are in the little book entitled "The Giant and Other Nonsense Verse." Published in Ithaca, N. Y.



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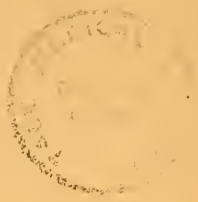




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